THE SURGEON GENERAL'S REPORT ON NUTRITION AND HEALTH

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Former Chief, Nutrition Branch, Office of
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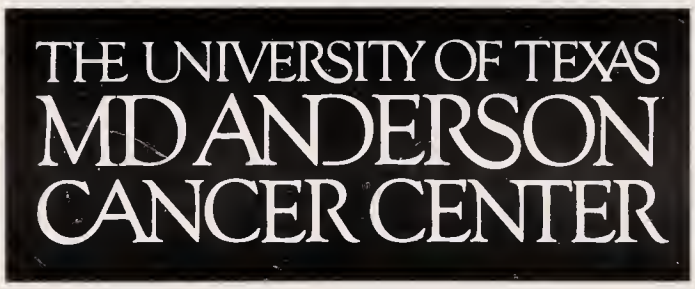
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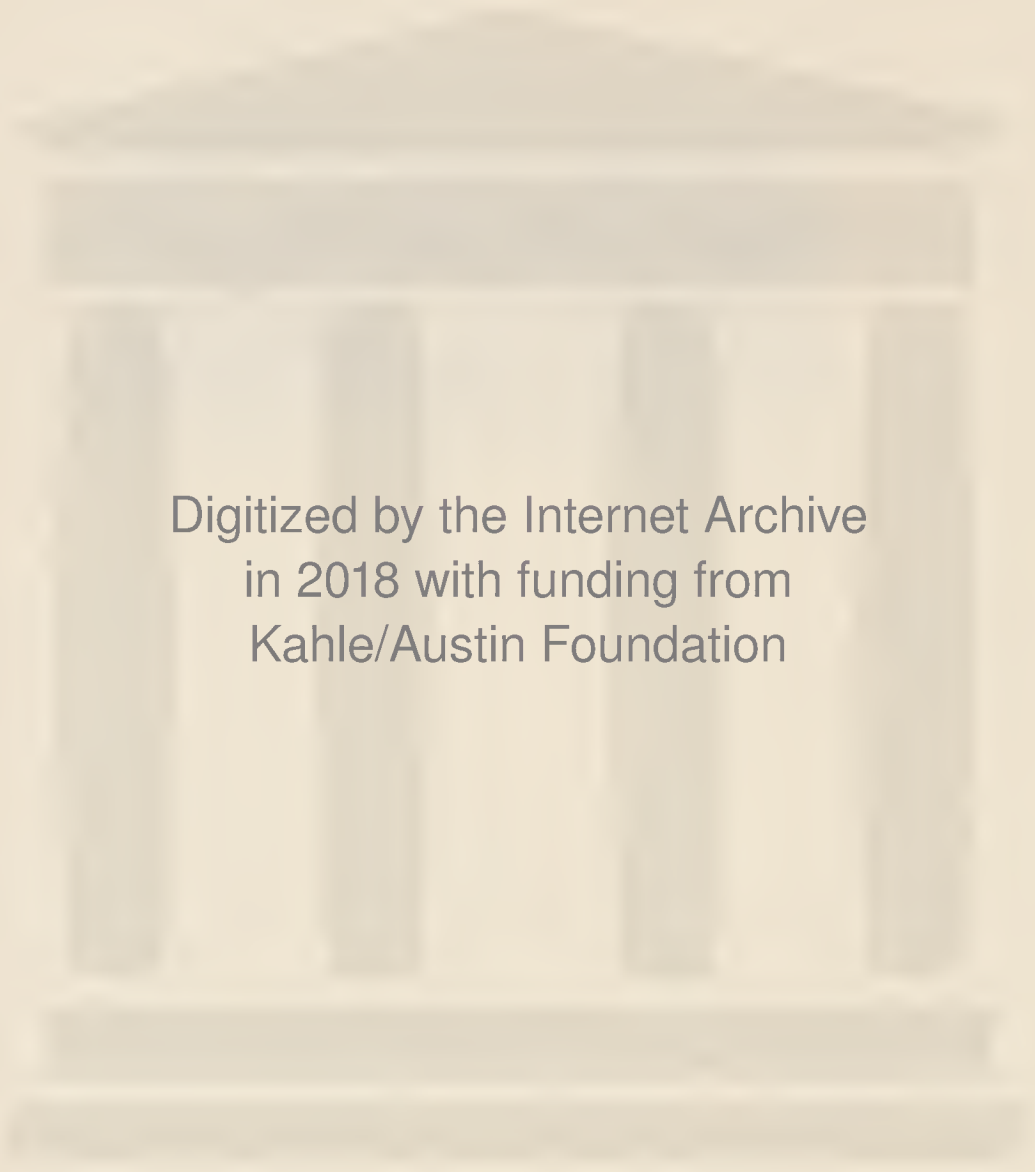

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THE SURGEON GENERAL'S REPORT ON

NUTRITION & HEALTH

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U. S. Department of Health and Human Services

Introduction by Marion Nestle, Ph.D., M.P.H.

with Recipes, Menu Plans, and Important Diet Tips by
Patricia Hausman, M.S., L.N., and Judith Benn Hurley
for the American Nutritionists Association

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MESSAGE FROM THE SURGEON GENERAL

I am pleased to transmit to the Secretary of the Department of Health and Human Services this first Surgeon General's Report on Nutrition and Health. It was prepared under the auspices of the Department's Nutrition Policy Board, and its main conclusion is that overconsumption of certain dietary components is now a major concern for Americans. While many food factors are involved, chief among them is the disproportionate consumption of foods high in fats, often at the expense of foods high in complex carbohydrates and fiber—such as vegetables, fruits, and whole grain products—that may be more conducive to health.

I offer this Report in the context of the obligation of the Surgeon General to inform the American public of developments in the science base that have widespread implications for human health. Perhaps the classic example of such reports is the one issued in 1964 during the tenure of one of my predecessors, Dr. Luther Terry, which summarized the epidemiologic evidence available at the time on the relationship of tobacco to health. This report called attention to the inescapable conclusion that cigarettes were a major source of illness and death for those who smoked—at that time a majority of adult men.

This Surgeon General's Report on Nutrition and Health follows the tradition of the original report on smoking and health. It addresses an area of some controversy and substantial misunderstanding. And the relative magnitude of the associated health concerns is comparable, with dietary factors playing a prominent role in five of the ten leading causes of death for Americans. In addition, the depth of the science base underlying its findings is even more impressive than that for tobacco and health in 1964, with animal and clinical evidence adding to the epidemiologic studies.

On the other hand there are some fundamental differences. Most

obvious is the fact that food is necessary for good health. Foods contain nutrients essential for normal metabolic function, and when problems arise, they result from imbalance in nutrient intake or from harmful interaction with other factors. Moreover, we know today much more about individual variation in response to nutrients than we know about possible variations in response to tobacco. Some people are clearly more susceptible than others to problems from diets that are, for example, higher in fat or salt.

Also, unlike the experience for tobacco in 1964, people are already making dietary changes, as witnessed by the shift to products lower in saturated fats. Nonetheless, the important effects of the dietary factors underlying problems like coronary heart disease, high blood pressure, stroke, some types of cancer, diabetes, obesity—problems that represent the leading health threats for Americans—indicate the potential for substantial gains to be accrued by the recommendations contained in this Report.

It is important to emphasize that the focus of this Report is primarily on the relationship of diet to the occurrence of chronic diseases. The Report is not intended to address the problems of hunger or undernutrition that may occur in the United States among certain subgroups of the population. All Americans should have access to an appropriate diet, but they do not. And even though the size and numbers of problems related to inadequate access to food are proportionately much smaller than those related to dietary excesses and imbalances, the problems of access to food are of considerable concern to me, personally, wherever they may occur.

The apparently sizable numbers of people resorting to the use of soup kitchens and related food facilities, as well as the possible role of poor diet as a contributor to the higher infant mortality rates associated with inadequate income, suggest the need for better monitoring of the nature and extent of the problem and for sustained efforts to correct the underlying causes of diminished health due to inadequate or inappropriate diets.

This report was prepared primarily for nutritional policy makers, although the eventual beneficiaries of better nutritional policy will be the American people. I am convinced that with a concerted effort on the part of policy makers throughout the Nation, and eventually by the public, our daily diets can bring a substantial measure of better health

to all Americans. I commend to them the recommendations of this Report.

C. Everett Koop, M.D., Sc.D.
Surgeon General
U.S. Public Health Service

FOREWORD

This first *Surgeon General's Report on Nutrition and Health* marks a key event in the history of public health in the United States. While the Report has been developed for use by policymakers, it offers lessons that can be directly applied to the public. It responds to the increasing interest of scientists, health professionals, and the American people in the role of diet in health promotion. Within recent years, concerns about nutrition and health have expanded beyond the need to prevent deficiencies to encompass the effects of typical American dietary patterns on the incidence of chronic diseases that are leading causes of death and disability in this country. Although scientific research has provided substantial insight into the ways specific dietary factors influence specific diseases, there are still many uncertainties about diet-disease relationships. The Department of Health and Human Services, through the Public Health Service and the Surgeon General, welcomes the responsibility to evaluate the current state of knowledge and to advise the public accordingly.

This Report reviews the scientific evidence that relates dietary excesses and imbalances to chronic diseases. On the basis of the evidence, it recommends dietary changes that can improve the health prospects of many Americans. Of highest priority among these changes is to reduce intake of foods high in fats and to increase intake of foods high in complex carbohydrates and fiber.

The evidence presented here indicates the convergence of similar dietary recommendations that apply to prevention of multiple chronic diseases. The recommendation to reduce dietary fat, for example, aims to reduce the risk for coronary heart disease, diabetes, obesity, and some types of cancer. This advice is not new. But it is now substantiated by a large body of evidence derived from many different kinds of research—a research base that is now even more comprehensive than

was the case for the pioneering 1964 *Surgeon General's Report on Smoking and Health*.

The weight of this evidence and the magnitude of the problems at hand indicate that it is now time to take action. In the cause of good health for all our citizens, I urge support for this Report's recommendations by every sector of American society.

OTIS R. BOWEN, M.D.
Secretary

PREFACE

The Public Health Service of the Department of Health and Human Services has long maintained an interest in the relationship between food and health. In the 1970s, this interest began to focus on the ways in which dietary excesses and imbalances increase the risk for chronic diseases. With the publication in 1979 of *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention,* attention turned toward environmental and behavioral changes that Americans might make to reduce their risks for morbidity and mortality. Nutrition was one such priority area. The 1980 report *Promoting Health/ Preventing Disease: Objectives for the Nation* included 17 specific, quantifiable objectives in nutrition designed to reduce risks and to prevent illness and death. Also in 1980, the Department published, jointly with the U.S. Department of Agriculture, the first edition of *Dietary Guidelines for Americans*. This report, revised in 1985, includes seven recommendations that, taken together, address the relationship between diet and chronic diseases.

Diseases such as coronary heart disease, stroke, cancer, and diabetes remain leading causes of death and disability in the United States. Substantial scientific research over the past few decades indicates that diet can play an important role in prevention of such conditions. The Public Health Service has now reviewed this research and has produced a comprehensive analysis of the relationship between dietary factors and chronic disease risk. This *Surgeon General's Report on Nutrition and Health* summarizes research on the role of diet in health promotion and disease prevention. Its findings indicate the great importance of diet to health. They demonstrate that changes in present dietary practices of Americans could produce substantial gains in the health of the population. The Public Health Service is committed to improving the health of Americans through its programs in education, services, and research.

One mechanism for improving the health of Americans is through

the 1990 Health Objectives for the Nation. The role of nutrition in health will continue to be a focus of national health priorities as we develop new objectives for the year 2000. Federal, state, and local governments, the American public, the food industry, and scientists and health professionals can work together to encourage Americans to make healthy food choices and to achieve national health goals.

I am pleased to commend to the American people this review of the scientific evidence that links diet to chronic disease, and I urge that the findings of this important Report be given your careful consideration.

Robert E. Windom, M.D.
Assistant Secretary for Health

THE SURGEON GENERAL'S REPORT ON NUTRITION & HEALTH

INTRODUCTION

Marion Nestle, Ph.D., M.P.H.

The *Surgeon General's Report on Nutrition and Health* represents a remarkable achievement. For four years, nutrition experts in the federal government, aided by literally hundreds of colleagues in universities, professional schools, industries, communities, and state and local government agencies, examined the results of more than 2,500 scientific studies in order to determine the links between diet and disease.

As managing editor of the Report during its last two years of preparation, I can testify to its landmark status. The fact that this broad panel of experts was able to reach consensus on the implications of that evidence marks a milestone in the recent history of nutrition. The consensus demonstrates that there can no longer be any doubt that diet is important to health. It is now time to move beyond dietary advice and to take action to put it into practice. This report lays the foundation for such action and, in so doing, demonstrates the need for a new cultural environment for American eating habits—one that promotes healthier food choices.

In this respect, this report follows the tradition of the 1964 *Surgeon General's Report on Smoking and Health* which documented the substantial evidence then available implicating cigarette smoking as a contributing cause of lung cancer, heart disease, and other serious illnesses. The smoking report elicited further studies and legislative actions that have led to dramatic changes in individual behavior, as well as in public attitudes toward smoking. In 1964, cigarette smoking was socially acceptable. Today, 25 years later, it is not. This new *Surgeon General's Report on Nutrition and Health* has a similar aim—to influence public nutrition policies and, ultimately, personal food choices that promote better health for Americans.

GENESIS OF THE REPORT

To understand how the Report has contributed to our understanding of the impact of diet on health, it helps to know something of its history. *The Surgeon General's Report on Nutrition and Health* was conceived in response to a major shift in nutritional priorities which has taken place in the United States during this century—from a focus on diseases of malnutrition caused by inadequate intake of calories, protein, vitamins, or minerals to a new focus on chronic diseases associated with dietary excesses and imbalances.

Federal dietary recommendations have reflected this shift (see Table 1 "Federal Dietary Recommendations for the General Public, 1917–1988" on page 4). In the early 1900s, the government advised people to include portions from several groups of foods in the daily diet in order to meet calorie needs. High-energy foods containing fat and sugar were recommended specifically. As more was learned about the need for vitamins and minerals, an adequate diet became defined as one that provided enough nutrients from foods in the basic groups to prevent deficiency diseases. Dietary recommendations did not distinguish between foods of high or low fat content, not did they suggest limits on the amount or types of food that people should eat.

LINK TO CHRONIC DISEASES

By the mid-1970s, it was apparent that diets too high in fat and cholesterol, calories, salt, and alcohol were associated with the major causes of illness and death in the United States. Among the ten leading causes, for example, are five that have been linked to excessive or unbalanced intake of dietary factors: coronary heart disease, certain types of cancer, strokes, diabetes, and atherosclerosis. Another three—cirrhosis of the liver, accidents, and suicides—have been associated with excessive alcohol consumption (see Table 3 of the Summary and Recommendations on page 15).

The precise contribution of diet to these diseases is as yet uncertain. Chronic diseases often have multiple causes, and it is difficult to distinguish the role of diet from genetic or other behavioral determinants of disease such as cigarette smoking or lack of exercise. Despite this uncertainty, the overwhelming magnitude of diet-related problems is

reason enough to demand dietary changes. The leading chronic diseases account for nearly three-quarters of all deaths annually in the United States. When the effects of obesity, high blood pressure, dental diseases, and osteoporosis are also considered, it becomes evident that diet-related diseases affect the vast majority of Americans, cause untold personal suffering, and account for astronomical health care costs. Even if dietary changes result in only a small reduction in disease risk, the health benefits to the nation would be substantial.

To reflect this new perspective, the concept of dietary adequacy was redefined to include prevention of chronic—as well as deficiency—diseases. In 1977, *Dietary Goals for the United States*, a report issued by the U.S. Senate Committee on Nutrition and Human Needs, proposed specific percentage recommendations for consumption of complex carbohydrates (starch) and fiber, total and saturated fat, cholesterol, salt, and sugar. It also proposed dietary changes to achieve the target levels: increased consumption of vegetables, fruits, and grains; selection of leaner meats and low-fat dairy products; and food preparation methods that add little or no fat, salt, or sugar.

These dietary principles, although not the percentage recommendations, were supported and expanded by the 1979 *Surgeon General's Report on Health Promotion and Disease Prevention* and by the 1980 pamphlet *Nutrition and Your Health: Dietary Guidelines for Americans*, jointly produced by the departments of Agriculture and Health and Human Services.

Each of these publications was followed by intense debate among nutrition professionals in government, research institutions, and the food industry, with three main points at issue: How adequate was the scientific evidence on which the recommendations were based? Did the dietary recommendations apply to everyone or just to individuals known to be at risk for chronic disease? Was it possible to follow recommendations without drastic changes in current eating patterns?

These are important questions that deserve authoritative answers. To meet the government's responsibility to address such issues, the then assistant secretary for health, Dr. Edward Brandt, Jr., directed the Public Health Service (the Department of Health and Human Services' agency that includes, among others, the National Institutes of Health, the Food and Drug Administration, and the Centers for Disease Control) to undertake a comprehensive review of scientific studies related to diet and health, to examine this evidence across the full spectrum of chronic

Table 1

FEDERAL DIETARY RECOMMENDATIONS FOR THE GENERAL PUBLIC, 1917–1988

Year	Agency[b]	Publication	Recommendation[a]							
			Variety	Maintain Ideal Body Weight	Include Starch and Fiber	Limit Sugar	Limit Fat	Limit Choles-terol	Limit Salt	Limit Alcohol
1917	USDA	What the Body Needs—Five Food Groups	+		+	*	*			
1942	USDA	Food for Freedom—Daily Eight	+		+		*			
1943	USDA	National Wartime Nutrition Guide—Basic Seven	+		+		*			
1946	USDA	National Food Guide—Basic Seven	+		+		*			
1946	USDA	Food for Growth—Four Food Groups	+		+					
1958	USDA	Food for Fitness—Four Food Groups	+		+					
1977	U.S. Senate	Dietary Goals for the U.S.		+	+	+	+	+	+	
1979	USDA	Building a Better Diet—Five Food Groups	+	+	+	+	+	+	+	+
1979	DHEW	Health People: The Surgeon General's Report on Health Promotion and Disease Prevention	+	+	+	+	+	+	+	+

1979	DHEW/NCI	Statement on Diet, Nutrition, and Cancer—Prudent Interim Principles	+	+	+		+			+
1980	USDA/DHHS	Dietary Guidelines for Americans	+	+	+	+	+	+	+	+
1980	DHHS	National 1990 Nutrition Objectives	+	+	+	+	+	+	+	+
1984	DHHS/NHLBI	Recommendations for Control of High Blood Pressure		+			+		+	+
1985	USDA/DHHS	Dietary Guidelines for Americans, 2nd edition	+	+	+	+	+	+	+	+
1986	DHHS/NCI	Cancer Control Nutrition Objectives for the Nation: 1985–2000		+	+		+			+
1987	DHHS/NHLBI	National Cholesterol Education Program Guidelines	+	+	+		+	+		+
1988	DHHS/NCI	Dietary Guidelines for Cancer Prevention	+	+	+		+		+	+

*Recommended for *inclusion* in the daily diet, as opposed to subsequent recommendations to *limit* intake.

[a]Other recommendations include: increased consumption of foods containing vitamins and minerals (USDA 1917–1958; NCI 1986), increased physical activity (USDA/DHHS 1980, 1985; DHHS 1980), and reduced intake of salt-cured or smoked foods (NCI 1988).

[b]USDA = U.S. Department of Agriculture, U.S. Senate = U.S. Senate Select Committee on Nutrition and Human Needs, DHEW = Department of Health, Education, and Welfare, DHHS = Department of Health and Human Services, NCI = National Cancer Institute, NHLBI = National Heart, Lung, and Blood Institute.

diseases, and—in the tradition of the first and subsequent reports on cigarette smoking—to develop a report from the Surgeon General devoted exclusively to science and policy issues related to diet.

CONCLUSIONS AND RECOMMENDATIONS OF THE REPORT

The Summary and Recommendations section of the 712-page report, issued more than four years after the initial directive, is presented in this book. Much of that preparation time was required for extensive review of the scientific evidence and development of the Public Health Service consensus on the conclusions, recommendations, and policy implications of that evidence. The result of that effort is a report that firmly establishes the scientific basis of diet-disease relationships and provides overwhelming evidence for three major conclusions:

1. *Improvements in diet can reduce chronic disease risk.* An overall reduction in intake of fat (especially saturated fat), cholesterol, calories, salt, and alcohol, and an overall increase in intake of foods containing complex carbohydrates and fiber should reduce the risk for coronary heart disease, certain cancers, diabetes, obesity, high blood pressure, stroke, and other chronic conditions.

2. *Similar dietary recommendations apply to virtually all chronic diseases.* The same set of recommendations is appropriate not only for prevention of heart disease, but also for certain cancers and the other conditions noted above.

3. *Reduction of fat intake is the first dietary priority.* A decrease in intake of fat, especially saturated fat, should reduce the risk for heart disease and certain cancers—the leading causes of death in the United States. Because fat contains more than twice the calories of equivalent amounts of protein or carbohydrate, decreased fat intake should also reduce the risk of obesity, diabetes, and other conditions associated with excessive caloric intake.

The report also provides overwhelming evidence to support five dietary recommendations directed to the general public (see Table 2 "Recommendations" on pages 13–14): reduce intake of fats and cholesterol; maintain appropriate body weight; increase intake of complex carbo-

hydrates and fiber; reduce intake of sodium; and limit intake of alcohol. In addition, it recommends adequate water fluoridation and an increased intake of foods containing calcium or iron to special population groups at risk of deficient intake of these substances. Finally, it suggests restrictions on sugar intake for children, the group most vulnerable to tooth decay. These recommendations are entirely consistent with previous advice.

This report ends any scientific controversy. There is no doubt that diet affects chronic-disease risk. In addition, because of the enormity of the impact of diet-related diseases, the report demonstrates that virtually all Americans will benefit from following these recommendations.

NEW PRIORITIES

In settling these issues, *The Surgeon General's Report on Nutrition and Health* has moved nutritional priorities to a new and more challenging stage. Attention now shifts to the remaining problem—implementation of dietary guidelines. The need to address this problem is urgent. When it comes to diet, Americans understand the principles very well, but just do not follow them.

National surveys report that public knowledge of nutrition is becoming increasingly sophisticated. The vast majority of adults, for example, are aware of the link between diets high in fat and cholesterol, high blood cholesterol, and coronary heart disease. Six out of ten Americans say they have changed their diets recently to prevent chronic disease.

But surveys that examine what Americans are actually eating reveal a fundamental contradiction. Intake of saturated fat illustrates this point. The major sources of saturated fat in the current United States food supply are meat (accounting for 35 percent of the total saturated fat available), dairy products (20 percent), and cooking and table fats and oils (34 percent). To follow the Surgeon General's recommendation to reduce saturated-fat intake, fatty meats such as beef must be replaced with leaner meats, poultry, and fish; dairy products must be limited to those low in fat; and intake of fruits, vegetables, and grains must be substantially increased to meet caloric requirements.

Although many of us have replaced our intake of whole milk with skim milk, and butter with margarine, and are eating a bit less beef, the average amount of saturated fat in the American diet has not changed

significantly for more than 50 years. We compensate efficiently for these reductions by eating more cheese and more ice cream. On any given day, more than half of all Americans eat red meat and more than 40 percent eat high-fat lunch meats. To further emphasize the contradiction, overall fat intake is also increasing, due largely to increased use of salad dressings and table spreads.

Nor are we replacing high-fat foods with fruits, vegetables, or grains. Dietary surveys find that more than 40 percent of Americans eat no fruit on any given day, nearly half eat no vegetables other than potatoes, beans, or salad, and more than 80 percent eat no high-fiber bread or cereal.

INFLUENCES ON FOOD CHOICES

Why aren't we changing our diets the way we know we are supposed to and, apparently, would like to? This question must be answered if we are to understand how to help people make healthier food choices. At the simplest level, people choose foods that taste, feel, look, or smell good, are familiar, or are associated with pleasant experiences. But food preferences do not occur in a vacuum; they are greatly influenced by the existing social, economic, and cultural environment. Research has shown that family and ethnic background, levels of education and income, age, and gender all affect the diets of individuals.

Even more important are environmental and institutional effects on food choices. People can only eat foods that have been produced and marketed and are readily available. The relationship between culture, food production, and food choices is complex. Yet, it is evident that current demographic patterns and trends in the production and marketing of foods have—and will continue to have—profound effects on the American diet. Here are just a few examples:

- In 1987, Americans spent more than half of their approximately $500 billion food budget on meals prepared outside the home.
- In 1987, more than half of all restaurant visits by people age 34 and under were for takeout meals.
- In 1987, 40 percent of Americans ate out more than once a day; only 8 percent did not eat out regularly.

- In 1987, more than 60 percent of women with children under the age of 6 were in the labor force, as were 75 percent or more of women with children ages 6 to 17.
- In 1987, 62 percent of U.S. households owned microwave ovens.
- In 1986, the average number of items in a supermarket was nearly 20,000.
- In 1987, more than 7,800 new food products were introduced into the marketplace; of these, more than 1,100 were candy, gum, or snacks.
- In 1987, the producers of food, candy, soft drinks, fast foods, beer, wine, and liquor among the top 100 national advertisers spent a total of nearly $11 billion to promote their products.

These observations tell us that we live in a culture where convenience in eating has become a necessity, where preparing meals at home grows increasingly uncommon, and where alcohol and foods high in calories, fat, sugar, and salt are actively—and expensively—promoted. Yet, we also live in a culture where the words "light" and "healthy" have been shown repeatedly to increase product sales. In this environment, making healthier food choices becomes a formidable challenge.

POLICY RECOMMENDATIONS

To meet this challenge, education is essential, but it is not sufficient. If we are to accomplish the Surgeon General's recommendations, we will need to make institutional changes that alter the culture of food consumption in this country.

To promote such changes, *The Surgeon General's Report* recommends improvements in present policies that govern nutrition education, services, and research. It calls for better nutrition education for the public, especially for the groups at greatest risk of chronic disease—the poor and certain minorities—and it notes the need for removing barriers to optimal health and nutritional care for the most vulnerable segments of our population. It calls for improved nutrition training of physicians and other health professionals who advise the public.

The report recommends development of more useful nutrition labels

on food packages. It asks the food industry to increase the availability of foods and food products that are low in fat, yet also meet the other dietary principles. It recommends that all food-service establishments improve the nutritional balance of the meals they serve.

Such recommendations are directed toward policymakers in the government, in the health professions, in education, and in the food industry. The eventual beneficiaries of new policies will be individuals making personal food choices. And that is why this book is useful. It provides facts to demonstrate the value of healthy eating, guidelines for people who would like to eat better, and recipes that prove that taste and pleasure do not have to be sacrificed to meet dietary recommendations.

As has been the case in educating the public against cigarette smoking, we need to find ways to make healthy eating the normal, acceptable standard of behavior. If achieving this goal is going to take another 25 years, we had better get started right away.

I

SUMMARY AND RECOMMENDATIONS

This Report addresses the substantial impact of daily dietary patterns on the health of Americans. Good health does not always come easily. It is the product of complex interactions among environmental, behavioral, social, and genetic factors. Some of these are, for practical purposes, beyond personal control. But there are many ways in which each of us can influence our chances for good health through the daily choices we make.

In recent years, scientific investigations have produced abundant information on the ways personal behavior affects health. This information can help us decide whether to smoke, when and how much to drink, how far to walk or climb stairs, whether to wear seat belts, and how or whether to engage in any other activity that might alter the risk of incurring disease or disability. For the two out of three adult Americans who do not smoke and do not drink excessively, one personal choice seems to influence long-term health prospects more than any other: what we eat.

Food sustains us, it can be a source of considerable pleasure, it is a reflection of our rich social fabric and cultural heritage, and it adds valued dimensions to our lives. Yet what we eat may affect our risk for several of the leading causes of death for Americans, notably, coronary heart disease, stroke, atherosclerosis, diabetes, and some types of cancer. These disorders together now account for more than two-thirds of all deaths in the United States.

Undernutrition remains a problem in several parts of the world, as well as for certain Americans. But for most of us the more likely problem has become one of overeating—too many calories for our activity levels and an imbalance in the nutrients consumed along with them. Although much is still uncertain about how dietary patterns protect or injure human health, enough has been learned about the overall health impact of the

dietary patterns now prevalent in our society to recommend significant changes in those patterns.

This first *Surgeon General's Report on Nutrition and Health* offers comprehensive documentation of the scientific basis for the recommended dietary changes. Through the extensive review contained in its chapters, the Report examines in detail current knowledge about the relationships among specific dietary practices and specific disease conditions and summarizes the implications of this information for individual food choices, public health policy initiatives, and further research. **The Report's main conlusion is that overconsumption of certain dietary components is now a major concern for Americans. While many food factors are involved, chief among them is the disproportionate consumption of foods high in fats, often at the expense of foods high in complex carbohydrates and fiber that may be more conducive to health.** A list of the key recommendations based on the evidence presented in the Report is provided in Table 2 (see pages 13–14).

Leading Causes of Illness and Death in the U.S.

Diet has always had a vital influence on health. Until as recently as the 1940s, diseases such as rickets, pellagra, scurvy, beriberi, xerophthalmia, and goiter (caused by lack of adequate dietary vitamin D, niacin, vitamin C, thiamin, vitamin A, and iodine, respectively) were prevalent in this country and throughout the world. Today, thanks to an abundant food supply, fortification of some foods with critical trace nutrients, and better methods for determining and improving the nutrient content of foods, such "deficiency" diseases have been virtually eliminated in developed countries. For example, the introduction of iodized salt in the 1920s contributed greatly to eliminating iodine-deficiency goiter as a public health problem in the United States. Similarly, pellagra disappeared subsequent to the discovery of the dietary causes of this disease. Nutrient deficiencies are reported rarely in the United States, and the few cases of protein-energy malnutrition that are listed annually as causes of death generally occur as a secondary result of severe illness or injury, child neglect, the problems of the house-bound aged, premature birth, alcoholism, or some combination of these factors.

As the diseases of nutritional deficiency have diminished, they have been replaced by diseases of dietary excess and imbalance—problems that now rank among the leading causes of illness and death in the

Table 2

RECOMMENDATIONS OF SURGEON GENERAL'S REPORT

Issues for Most People:

- *Fats and cholesterol:* Reduce consumption of fat (especially saturated fat) and cholesterol. Choose foods relatively low in these substances, such as vegetables, fruits, whole grain foods, fish, poultry, lean meats, and low-fat dairy products. Use food preparation methods that add little or no fat.
- *Energy and weight control:* Achieve and maintain a desirable body weight. To do so, choose a dietary pattern in which energy (caloric) intake is consistent with energy expenditure. To reduce energy intake, limit consumption of foods relatively high in calories, fats, and sugars, and minimize alcohol consumption. Increase energy expenditure through regular and sustained physical activity.
- *Complex carbohydrates and fiber:* Increase consumption of whole grain foods and cereal products, vegetables (including dried beans and peas), and fruits.
- *Sodium:* Reduce intake of sodium by choosing foods relatively low in sodium and limiting the amount of salt added in food preparation and at the table.
- *Alcohol:* To reduce the risk for chronic disease, take alcohol only in moderation (no more than two drinks a day), if at all. Avoid drinking any alcohol before or while driving, operating machinery, taking medications, or engaging in any other activity requiring judgment. Avoid drinking alcohol while pregnant.

Other Issues for Some People:

- *Fluoride:* Community water systems should contain fluoride at optimal levels for prevention of tooth decay. If such water is not available, use other appropriate sources of fluoride.

Table 2

(Cont.)

- *Sugars:* Those who are particularly vulnerable to dental caries (cavities), especially children, should limit their consumption and frequency of use of foods high in sugars.
- *Calcium:* Adolescent girls and adult women should increase consumption of foods high in calcium, including low-fat dairy products.
- *Iron:* Children, adolescents, and women of childbearing age should be sure to consume foods that are good sources of iron, such as lean meats, fish, certain beans, and iron-enriched cereals and whole grain products. This issue is of special concern for low-income families.

United States, touch the lives of most Americans, and generate substantial health care costs. Table 3, for example, lists the 10 leading causes of death in the United States in 1987 (see page 15).

In addition to the five of these causes that scientific studies have associated with diet (coronary heart disease, some types of cancer, stroke, diabetes mellitus, and atherosclerosis), another three—cirrhosis of the liver, accidents, and suicides—have been associated with excessive alcohol intake.

Although the precise proportion attributable to diet is uncertain, these eight conditions accounted for nearly 1.5 million of the 2.1 million total deaths in 1987. Dietary excesses or imbalances also contribute to other problems such as high blood pressure, obesity, dental diseases, osteoporosis, and gastrointestinal diseases. Together, these diet-related conditions inflict a substantial burden of illness on Americans. For example:

- *Coronary Heart Disease*. Despite the recent sharp decline in the death rate from this condition, coronary heart disease still accounts for the largest number of deaths in the United States. More than 1.25 million heart attacks occur each year (two-thirds of them in men), and more than 500,000 people die as a result. In 1985, illness and deaths from

Table 3

ESTIMATED TOTAL DEATHS AND PERCENT OF TOTAL DEATHS FOR THE 10 LEADING CAUSES OF DEATH: UNITED STATES, 1987

Rank	Cause of Death	Number	Percent of Total Deaths
1[a]	Heart diseases	759,400	35.7
	(Coronary heart disease)	(511,700)	(24.1)
	(Other heart disease)	(247,700)	(11.6)
2[a]	Cancers	476,700	22.4
3[a]	Strokes	148,700	7.0
4[b]	Unintentional injuries	92,500	4.4
	(Motor vehicle)	(46,800)	(2.2)
	(All others)	(45,700)	(2.2)
5	Chronic obstructive lung diseases	78,000	3.7
6	Pneumonia and influenza	68,600	3.2
7[a]	Diabetes mellitus	37,800	1.8
8[b]	Suicide	29,600	1.4
9[b]	Chronic liver disease and cirrhosis	26,000	1.2
10[a]	Atherosclerosis	23,100	1.1
. . .	All causes	2,125,100	100.0

[a]Causes of death in which diet plays a part.
[b]Causes of death in which excessive alcohol consumption plays a part.

Source: National Center for Health Statistics, *Monthly Vital Statistics Report*, vol. 37, no. 1, April 25, 1988.

coronary heart disease cost Americans an estimated $49 billion in direct health care expenditures and lost productivity.

- *Stroke*. Strokes occur in about 500,000 persons per year in the United States, resulting in nearly 150,000 deaths in 1987 and long-term disability for many individuals. Approximately 2 million living Americans suffer from stroke-related disabilities, at an estimated annual cost of more than $11 billion.

- *High Blood Pressure*. High blood pressure (hypertension) is a major risk factor for both heart disease and stroke. Almost 58 million people in the United States have hypertension, including 39 million who are under age 65. The occurrence of hypertension increases with age and is higher for black Americans (of whom 38 percent are hypertensive) than for white Americans (29 percent).

- *Cancer*. More than 475,000 persons died of cancer in the United States in 1987, making it the second leading cause of death in this country. During the same period, more than 900,000 new cases of cancer occurred. The costs of cancer for 1985 have been estimated to be $22 billion for direct health care, $9 billion in lost productivity due to treatment or disability, and $41 billion in lost productivity due to premature mortality, for a total cost of $72 billion.

- *Diabetes Mellitus*. Approximately 11 million Americans have diabetes, but almost half of them have not been diagnosed. In addition to the nearly 38,000 deaths in 1987 attributed directly to this condition, diabetes also contributes to an estimated 95,000 deaths per year from associated cardiovascular and kidney complications. In 1985, diabetes was estimated to cost $13.8 billion per year, or about 3.6 percent of total health care expenses.

- *Obesity*. Obesity affects approximately 34 million adults ages 20 to 74 years in the United States, with the highest rates observed among the poor and minority groups. Obesity is a risk factor for coronary heart disease, high blood pressure, diabetes, and possibly some types of cancer as well as other chronic diseases.

- *Osteoporosis*. Approximately 15 to 20 million Americans are affected by osteoporosis, which contributes to some 1.3 million bone fractures per year in persons 45 years and older. One-third of women 65 years and older have vertebral fractures. On the basis of x-ray evidence,

by age 90 one-third of women and one-sixth of men will have suffered hip fractures, leading to death in 12 to 20 percent of those cases and to long-term nursing care for many who survive. The total costs of osteoporosis to the U.S. economy were estimated to be $7 to $10 billion in 1983.

- *Dental Diseases*. Dental caries and periodontal disease continue to affect a large proportion of Americans and cause substantial pain, restriction of activity, and work loss. Although dental caries among children, as well as some forms of adult periodontal disease, appear to be declining, the overall prevalence of these conditions imposes a substantial burden on Americans. The costs of dental care were estimated at $21.3 billion in 1985.

- *Diverticular Disease*. Because most persons with diverticular disease do not have symptoms, the true prevalence of this condition is unknown. Frequency increases with age, and up to 70 percent of people between the ages of 40 and 70 may be affected. In 1980, diverticulosis was accountable for some 200,000 hospitalizations.

In assessing the role that diet might play in prevention of these conditions, it must be understood that they are caused by a combination (and interaction) of multiple environmental, behavioral, social, and genetic factors. The exact proportion that can be attributed directly to diet is uncertain. Although some experts have suggested that dietary factors overall are responsible for perhaps a third or more of all cases of cancer, and similar estimates have been made for coronary heart disease, such suggestions are based on interpretations of research studies that cannot completely distinguish dietary from genetic, behavioral, or environmental causes.

We know, for example, that cigarette smoking exerts a powerful influence on the occurrence of both coronary heart disease and some types of cancer. We also know that some people are genetically predisposed to coronary heart disease, stroke, and diabetes and that the interaction of genetic predisposition with dietary patterns is an important determinant of individual risk. For these reasons, it is not yet possible to determine the proportion of chronic diseases that could be reduced by dietary changes. Nonetheless, it is now clear that diet contributes in substantial ways to the development of these diseases and that modification of diet can contribute to their prevention. The magnitude of the

health and economic cost of diet-related disease suggests the importance of the dietary changes suggested. This Report reviews these issues in detail.

Effect of Diet on Health

Whereas centuries of clinical observations and decades of basic and clinical research prove that dietary deficiencies of single, identifiable nutrients can cause disease, research on the relationship of dietary excesses and imbalances to chronic disease yields results that rarely provide such direct proof of causality. Instead, investigators must piece together various kinds of information from several kinds of sources. Nevertheless, the quantity of current animal, laboratory, clinical, and epidemiologic evidence that associates dietary excesses and imbalances with chronic disease is substantial and, when evaluated according to established principles, compelling.

Scientists must often draw inferences about the relationships between dietary factors and disease from laboratory animal studies or human metabolic and population studies that approach the issues indirectly. Data sources for such human studies include clinical and laboratory measurements of physiologic indicators of nutritional status or risk factors, as well as dietary intake data estimated for populations or individuals. Epidemiologic studies using these data compare dietary intake and disease rates in different countries or in defined groups within the same country.

Interpretations of animal studies are limited by uncertainties about their applicability to people. Clinical, laboratory, and dietary intake studies can provide useful information, but each has limitations. Currently available clinical and laboratory measurements reveal only a small part of the complex physiological responses to diet, and they may reflect past rather than current nutritional status. Dietary surveys depend on accurate recall of the types and portion sizes of consumed foods as well as on the assumption that the food intake during any one period represents typical intake. Reported intake, however, is not always accurate, and intake reported for a given period may differ significantly from that typical of longer time periods. Dietary intake data provide useful indicators for populations, but even when an association or correlation between a dietary factor and a disease is observed, it is often difficult to prove that the dietary factor is an actual or sole cause of that disease.

This difference between association and causation is basic to understanding the scientific evidence that links diet to chronic disease. Uncertainties in the ability to determine causation have sometimes made it difficult to achieve consensus on appropriate public health nutrition policies. Established principles require evaluation of the supporting evidence for a given association between a dietary factor and a disease on the basis of its consistency, strength, specificity, and biological plausibility. The evidence showing that dietary intake of saturated fat raises blood cholesterol, which in turn increases the chance of coronary heart disease, illustrates this point. The similarity in results from laboratory, clinical, and epidemiologic research, the apparent relationship between dose and effect in these studies, the observations that the increase in blood cholesterol level is specific to saturated fatty acids but not to other types, and the biological plausibility of explanations for the observations, when taken together, provide considerable support for concluding that the association is causal, at least for some individuals.

For some of the other diseases reviewed in this Report, the available evidence is less complete and less consistent. Nevertheless, much evidence supports credible associations between a dietary pattern of excesses and imbalances and several important chronic diseases. These associations, in turn, suggest that the overall health of Americans could be improved by a few specific but fundamental dietary changes.

KEY FINDINGS AND RECOMMENDATIONS

Even though the results of various individual studies may be inconclusive, the preponderance of the evidence presented in the Report's comprehensive scientific review substantiates an association between dietary factors and rates of chronic diseases. In particular, the evidence suggests strongly that a dietary pattern that contains excessive intake of foods high in calories, fat (especially saturated fat), cholesterol, and sodium, but that is low in complex carbohydrates and fiber, is one that contributes significantly to the high rates of major chronic diseases among Americans. It also suggests that reversing such dietary patterns should lead to a reduced incidence of these chronic diseases.

This *Surgeon General's Report on Nutrition and Health* provides a comprehensive review of the most important scientific evidence in support of current Federal nutrition policy as stated in the *Dietary Guide-*

lines for Americans. These *Guidelines*, issued jointly by the Department of Agriculture and the Department of Health and Human Services, recommend:

- Eat a variety of foods.
- Maintain desirable weight.
- Avoid too much fat, saturated fat, and cholesterol.
- Eat foods with adequate starch and fiber.
- Avoid too much sugar.
- Avoid too much sodium.
- If you drink alcoholic beverages, do so in moderation.

Evidence presented in this Report expands the focus of these seven guidelines and provides considerable insight into priorities. Clearly emerging as the primary priority for dietary change is the recommendation to reduce intake of total fats, especially saturated fat, because of their relationship to development of several important chronic disease conditions. Because excess body weight is a risk factor for several chronic diseases, maintenance of desirable weight is also an important public health priority. Evidence further supports the recommendation to consume a dietary pattern that contains a variety of foods, provided that these foods are generally low in calories, fat, saturated fat, cholesterol, and sodium.

Taken together, the recommendations in this Report promote a dietary pattern that emphasizes consumption of vegetables, fruits, and whole grain products—foods that are rich in complex carbohydrates and fiber and relatively low in calories—and of fish, poultry prepared without skin, lean meats, and low-fat dairy products selected to minimize consumption of total fat, saturated fat, and cholesterol.

The evidence presented in this Report suggests that such overall dietary changes will lead to substantial improvements in the nutritional quality of the American diet. Consuming a higher proportion of calories from fruits, vegetables, and grains may lead to a modest reduction in protein intake for some people, but this reduction is unlikely to impair nutritional status. Average levels of protein consumption in the United States, 60 grams per day for women and 90 grams per day for men,

are well above the National Research Council's recommendations of 44 and 56 grams per day, respectively.

The evidence also suggests that most Americans generally need not consume nutrient supplements. An estimated 40 percent of Americans consume supplemental vitamins, minerals, or other dietary components at an annual cost of more than $2.7 billion. Although nutrient supplements are usually safe in amounts corresponding to the Recommended Dietary Allowances (and such Allowances are set to ensure that the nutrient needs of practically all the population are met), there are no known advantages to healthy people consuming excess amounts of any nutrient, and amounts greatly exceeding recommended levels can be harmful. For example, some nutrients such as selenium have a narrow range of safe level of intake. Toxicity has been reported for most minerals and trace elements, as well as some vitamins, indicating that excessive supplementation with these substances can be hazardous.

The major findings and recommendations of *The Surgeon General's Report on Nutrition and Health* are noted below.

Fats and Cholesterol

Reduce consumption of fat (especially saturated fat) and cholesterol. Choose foods relatively low in these substances, such as vegetables, fruits, whole grain foods, fish, poultry, lean meats, and low-fat dairy products. Use food preparation methods that add little or no fat.

High intake of total dietary fat is associated with increased risk for obesity, some types of cancer, and possibly gallbladder disease. Epidemiologic, clinical, and animal studies provide strong and consistent evidence for the relationship between saturated fat intake, high blood cholesterol, and increased risk for coronary heart disease. Conversely, reducing blood cholesterol levels reduces the risk for death from coronary heart disease. Excessive saturated fat consumption is the major dietary contributor to total blood cholesterol levels. Dietary cholesterol raises blood cholesterol levels, but the effect is less pronounced than that of saturated fat. While polyunsaturated fatty acid consumption, and probably monounsaturated fatty acid consumption, lowers total blood cholesterol, the precise effects of specific fatty acids are not well defined.

Dietary fat contributes more than twice as many calories as equal

quantities (by weight) of either protein or carbohydrate, and some studies indicate that diets high in total fat are associated with higher obesity rates. In addition, there is substantial, although not yet conclusive, epidemiologic and animal evidence in support of an association between dietary fat intake and increased risk for cancer, especially breast and colon cancer. Similarly, epidemiologic studies suggest an association between gallbladder disease, excess caloric intake, high dietary fat, and obesity. More precise conclusions about the role of dietary fat await the development of improved methods to distinguish among the contributions of the high-calorie, high-fat, and low-fiber components of current American dietary patterns.

At present, dietary fat accounts for about 37 percent of the total energy intake of Americans—well above the upper limit of 30 percent recommended by the American Heart Association and the American Cancer Society, and above the percent consumed by many societies, such as Mediterranean countries, Japan, and China, for example, where coronary heart disease rates are much lower than those observed in the United States. Consumption of saturated fat and cholesterol is also substantially higher among many Americans than levels recommended by several expert groups.

The major dietary sources of fat in the American diet are meat, poultry, fish, dairy products, and fats and oils. Animal products tend to be higher in both total and saturated fats than most plant sources. Although some plant fats such as coconut and palm kernel oils also contain high proportions of saturated fatty acids, these make minor contributions to total intake of saturated fats in the United States. Dietary cholesterol is found only in foods of animal origin, such as eggs, meat, poultry, fish, and dairy products. To help reduce consumption of total fat, especially saturated fat and cholesterol, food choices should emphasize intake of fruits, vegetables, and whole grain products and cereals. They should also emphasize consumption of fish, poultry prepared without skin, lean meats, and low-fat dairy products. Among vegetable fats, those that are more unsaturated are better choices.

Finding Fat in the Animal Kingdom

For decades, animal foods like milk and meat have been labeled "protein foods" by virtue of their high levels of the nutrient. But in the process,

the high fat content of many animal protein foods went unmentioned. And easily so, since the fat in animal foods tends to be "hidden" fat invisible to the eye.

Learning where this hidden fat lurks is the first step toward reducing your fat intake. And, since the fat in dairy products and red meats is more saturated than the fat in most vegetable foods, if you cut back on the fatty foods from these food groups, you'll cut back on saturated fat too.

In the chart on pages 24–25, we classify animal protein foods based on their fat content. The idea is to emphasize the foods in the very lean or fairly lean column. Protein that comes with lots of fat is the kind that is best used sparingly, if at all.

An asterisk denotes foods that, despite their fairly low fat content, are very high in cholesterol.

Cutting Fat, But not Flavor

Often recipes call for more fat than is truly needed for good taste. Here are some tips for adapting recipes so that the fat goes, while the flavor stays.

- Use buttermilk (made from skim or low-fat milk), instead of whole milk, in baking. It lends a rich taste with little fat.
- Replace one egg in a recipe with two egg whites or with special egg-replacer powder available in health food stores.
- Sauté foods in stock or white wine rather than fat.
- Make vinaigrettes using a high-quality vinegar; you'll be able to use more vinegar and less oil.
- Thicken soups and sauces with cooked pureed carrots or potato, instead of butter or margarine.
- Try some of the new butter substitutes for topping vegetables and pasta; their taste has improved.
- Don't grease pans when cooking or frying; use nonstick cooking spray instead.
- Take advantage of the many fat-reduced products on the market, such as mayonnaises, cream cheeses, and cheeses.

(chart continues on p. 26)

FAT CONTENT OF ANIMAL PROTEIN FOODS

Very Lean	Fairly Lean	Fairly Fatty	Very Fatty	
Buttermilk, made from skim milk Low-fat cottage cheese Low-fat milk (½–1% milk fat by weight) Skim milk Skim-milk cheeses	Ice milk Low-fat milk (2% fat by weight) Low-fat yogurt, plain Regular cottage cheese (4% fat by weight)	Ice cream, regular Most part-skim hard cheeses Whole milk Whole-milk yogurt	Ice cream, rich Whole-milk cheeses (such as blue, Camembert, cheddar, Swiss, and most processed cheeses)	DAIRY
Chicken breast w/o skin Turkey fryer—breast	*Chicken liver, cooked w/o fat Chicken breast w/ skin Turkey fryer—cuts other than breast Turkey hen cuts w/o skin Turkey hen—breast w/ skin	Chicken dark meat w/ or w/o skin (lower w/o) Turkey hen cuts w/ skin (except breast)		POULTRY
Most fish fillets (cod, flounder, haddock, perch, pollock, sole) Most shellfish (crab, lobster, shrimp, scallops) Tuna, water-pack	Salmon, pink	Herring Sardines Salmon (red, King, or Atlantic)		FISH

	Roast beef from rump, armbone, or round, if trimmed of all fat Beef steaks from flank, round, and lean sirloin, if trimmed of all fat *Beef liver, cooked w/o fat Lamb leg or loin chop, if trimmed of all fat Veal, most cuts, if trimmed of all fat	Roast beef from rib or blade cut, if trimmed of all fat Beef steaks from club, porterhouse, T-bone cuts, if trimmed of all fat Untrimmed round steak Lamb rib or shoulder, if trimmed of all fat Pork leg (ham), loin or rib chop, or shoulder, if trimmed of all fat Untrimmed leg of lamb Lamb rib chops if trimmed of all fat Untrimmed veal, most cuts	Corned beef Ground beef (chuck) Spareribs Most fresh cuts of red meat, if untrimmed Bacon Most processed red meats (such as bologna, hot dogs, liverwurst, salami)	BEEF, LAMB, PORK & VEAL

Note: *Many factors influence the fat content of meat, and as a result, some pieces of a given cut may be far fattier (or leaner) than is typical. The distinctions in this chart are based on averages, but are best used only as a guide. Inspect meat—even lean cuts—carefully before buying, and choose those that appear to have as little visible white fat around the edges and within the meat. Always trim carefully before eating. The classification system is as follows:*

- *Very lean—20% or less of calories from fat*
- *Fairly lean—21 to 40% of calories from fat*
- *Fairly fatty—41 to 60% of calories from fat*
- *Very fatty—more than 60% of calories from fat*

- When cooking lean meats, remember that they love moist heat. Intense dry heat, such as broiling, will leave lean meats tough and dry, but moist-heat methods, like braising, let them retain their tenderness and juiciness. Slow cookers (crockpots) and claypots are also ideal for lean meats.
- Beware of processed foods containing palm kernel and coconut oils. They contain a higher proportion of saturated fats than most other vegetable oils.

Energy and Weight Control

Achieve and maintain a desirable body weight. To do so, choose a dietary pattern in which energy (caloric) intake is consistent with energy expenditure. To reduce energy intake, limit consumption of foods relatively high in calories, fats, and sugars and minimize alcohol consumption. Increase energy expenditure through regular and sustained physical activity.

People are considered overweight if their body mass index, or BMI (a ratio of weight to height described in the Report), exceeds the 85th percentile for young American adults (approximately 120 percent of desirable body weight); they are considered severely overweight if their BMI exceeds the 95th percentile (approximately 140 percent of desirable body weight). Overweight individuals are at an increased risk for diabetes mellitus, high blood pressure and stroke, coronary heart disease, some types of cancer, and gallbladder disease. Epidemiologic and animal studies have shown consistently that overall risk for death is increased with excess weight, with risk increasing as severity of obesity increases.

Type II (noninsulin-dependent) diabetes mellitus accounts for approximately 90 percent of all cases of diabetes and is strongly associated with obesity. Clinical studies indicate that weight loss can improve control of Type II diabetes.

Obesity increases the risk for high blood pressure, and consequently for stroke; it also increases blood cholesterol levels associated with coronary heart disease. In addition, it appears to be an independent risk factor for coronary heart disease. Weight reduction has been shown to

reduce high blood pressure and high blood cholesterol. Most obese individuals who achieve a more desirable body weight improve their cholesterol profile, achieving a decrease in both total blood cholesterol and LDL (low density lipoprotein) cholesterol.

Some studies have found an association between overweight and increased risk for several cancers, especially cancer of the uterus and breast. In addition, overweight increases the risk for gallbladder disease.

More than a quarter of American adults are overweight. Black women age 45 and above have the highest prevalence, about 60 percent. Although evidence suggests a genetic component to the tendency of many people to become overweight, patterns of dietary caloric intake and energy expenditure play a key role. Sustained and long-term efforts to reduce body weight can best be achieved as a result of improving energy balance by reducing energy consumption and raising energy expenditure through physical activity and exercise.

Maintenance of desirable body weight throughout the lifespan requires a balance between energy (calorie) intake and expenditure. Weight control may be facilitated by decreasing energy intake, especially by choosing foods relatively low in calories, fats, and sugars, and by minimizing alcohol consumption. Energy expenditure can be enhanced through regular physical activities such as daily walks or by jogging, bicycling, or swimming at least three times a week for at least 20 minutes.

Complex Carbohydrates and Fiber

Increase consumption of whole grain foods and cereal products, vegetables (including dried beans and peas), and fruits.

Dietary patterns emphasizing foods high in complex carbohydrates and fiber are associated with lower rates of diverticulosis and some types of cancer. The association shown in epidemiologic and animal studies between diets high in complex carbohydrates and reduced risk for coronary heart disease and diabetes mellitus is, however, difficult to interpret. The fact that such diets tend also to be lower in energy and fats, especially saturated fat and cholesterol, clearly contributes to this difficulty. Some evidence from clinical studies also suggests that water-soluble fibers from foods such as oat bran, beans, or certain fruits are associated with lower blood glucose and blood lipid levels. Con-

suming foods with dietary fiber is usually beneficial in the management of constipation and diverticular disease.

While inconclusive, some evidence also suggests that an overall increase in intake of foods high in fiber might decrease the risk for colon cancer. Among several unresolved issues is the role of the various types of fiber, which differ in their effects on water-holding capacity, viscosity, bacterial fermentation, and intestinal transit time.

Other food components associated with decreased cancer risk are commonly found in diets high in whole grain cereal products containing complex carbohydrates and fiber. In addition, some epidemiologic evidence suggests that frequent consumption of vegetables and fruits, particularly dark green and deep yellow vegetables and cruciferous vegetables (such as cabbage and broccoli), may lower risk for cancers of the lung and bladder as well as some cancers of the alimentary tract. However, the specific components in these foods that may have protective effects have not yet been established. Current evidence suggests the prudence of increasing consumption of whole grain foods and cereals, vegetables (including dried beans and peas), and fruits.

Getting Your Fill of Fiber

There's a fiber-rich food for every palate! That comes as a surprise to many people who are under the erroneous impression that wheat bran is the only source of fiber that really counts. Here we offer tips for finding other fiber-rich foods—and fitting them into your daily menu.

- Stuff a baked potato with broccoli for a fiber-rich dish that doesn't taste anything like bran. Both of those vegetable favorites rate high for fiber.
- Snack on fiber-rich treats. Corn-bran cereal (Crunchy Bran) makes a perfect snack; it's quick, ready to eat, and can be kept in a jar at work. Other cereals like Wheat Chex and Bran Chex can be easily made into tasty snack mixes. Try mixing them with unsalted popcorn and chopped dried fruit to add more flavor and fiber.

- Make your sweet tooth happy with fiber-rich fruits: apples, blackberries, raspberries, figs, prunes, and dates are all leaders on this count.
- Substitute whole wheat flour for some of the white flour in recipes. Start by replacing about ⅓ of the white flour with whole wheat; increase to half whole wheat next time if the texture meets your approval. When baking, try whole wheat pastry flour, available in health food stores.
- Add beans to soups and salads—they have so much fiber that even small amounts can count. For those who won't touch beans, use peas—also a good source.
- Crush whole-grain cereals, like shredded wheat or whole wheat flakes, with a rolling pin. Substitute for up to ⅓ of the flour in your favorite baked-goods recipe.
- Use spoon-size shredded wheat, Wheat Chex, or Bran Chex cereals instead of croutons with soups and salads.
- Discover the versatility of oats. Breakfast cereal and cookies are just the beginning. Oats also make a great extender for meats—for instance to replace bread crumbs in a meatloaf recipe. Quick oats also make a great piecrust; use them instead of cracker crumbs.
- Like oats, oat bran also has many uses. In addition to enjoying it as a hot cereal, you can sprinkle it on hot and cold foods or use it to replace some of the flour in baking. As you've been hearing, oat bran is rich in the type of fiber (water soluble) that helps to lower cholesterol.
- Use All-Bran or 100% Bran Cereal to top cottage cheese, yogurt, and frozen desserts. Many people prefer the texture of these cereals to that of unprocessed bran.
- Favor coarse-grain foods like unprocessed bran and course-textured crackers for the most laxative effect. These fiber sources don't have the cholesterol-lowering effect of foods like beans and oats, but appear to be the best choice for digestive health.

FIBER CONTENT OF FOODS

Low Sources of Fiber *Less than 1g of fiber*	*Serving*	Moderate Sources of Fiber *1–3 g of fiber*	*Serving*	Rich Sources of Fiber *4 g or more*	*Serving*
Breads and Cereals		**Breads and Cereals**		**Cereals**	
White bread	1 slice	Bran muffins	1 medium	All-Bran*,	1 ounce
Spaghetti, cooked	1 cup	Popcorn (air-popped)	1 cup	Bran Buds*,	
Rice, cooked	½ cup	Whole wheat bread	1 slice	100% Bran*,	
Cornflake-type cereals	1¼ cup (1 ounce)	Whole wheat spaghetti	1 cup	Bran Chex,	
		Grape-Nuts, Most, shredded wheat, Total, Wheat Chex, Wheaties, granola-type and Cheerio-type cereals	1 ounce	Corn Bran,	
				Cracklin' Bran,	
				40% bran flakes,	
				raisin bran	
Vegetables and Fruits				Bran, unprocessed*	¼ cup
Lettuce, shredded	1 cup			Wheat germ, toasted, plain	1 ounce
Mushrooms, sliced	½ cup				
Onions, sliced	½ cup	Oatmeal, cooked	¾ cup		
Pepper, green, sliced	½ cup				
Grapes	20	**Legumes (cooked) and Nuts**		**Legumes (cooked)**	
Watermelon	1 cup	Chickpeas and lentils	½ cup	Kidney, lima, navy, pinto, white beans	½ cup
Fruit juice	½ cup (4 ounces)	Almonds, peanuts	10 nuts		
		Vegetables		**Fruits**	
		Artichoke	1 small	Blackberries	½ cup
		Asparagus, green beans, brussels sprouts, cabbage, carrots, cauliflower, corn, peas, kale, parsnip,	½ cup	Dried prunes	3

spinach (cooked or raw), squash, turnip, bean sprouts, celery	½ cup
Potato	1 medium
Sweet Potato	½ medium
Tomato	1 medium
Fruits	
Apple	1 medium
Apricot, fresh	3 medium
Apricot, dried	5 halves
Banana	1 medium
Blueberries	½ cup
Cantaloupe	¼ melon
Cherries	10
Dates, dried	3
Figs, dried	1 medium
Grapefruit	½
Orange	1 medium
Peach	1 medium
Pear	1 medium
Pineapple	½ cup
Raisins	¼ cup
Strawberries	1 cup

(Foods marked with an * have 6 g or more of fiber per serving.)

From "Diet, Nutrition & Cancer Prevention: A Guide to Food Choices," U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, NIH Publication No. 85-2711, November 1984

Sodium

Reduce intake of sodium by choosing foods relatively low in sodium and limiting the amount of salt added in food preparation and at the table.

Studies indicate a relationship between a high sodium intake and the occurrence of high blood pressure and stroke. Salt contains about 40 percent sodium by weight and is used widely in the preservation, processing, and preparation of foods. Although sodium is necessary for normal metabolic function, it is consumed in the United States at levels far beyond the 1.1 to 3.3 grams per day found to be safe and adequate for adults by the National Research Council. Average current sodium intake for adults in the United States is in the range of 4 to 6 grams per day.

Blacks and persons with a family history of high blood pressure are at greater risk for this condition. While some people maintain normal blood pressure levels over a wide range of sodium intake, others appear to be "salt sensitive" and display increased blood pressure in response to high sodium intakes.

Although not all individuals are equally susceptible to the effects of sodium, several observations suggest that it would be prudent for most Americans to reduce sodium intake. These include the lack of a practical biological marker for individual sodium sensititivity, the benefit to persons whose blood pressures do rise with sodium intake, and the lack of harm from moderate sodium restriction.

Processed foods provide about a third or more of dietary sodium. Because about another third of the sodium consumed by Americans is added by the consumer, much can be done to reduce sodium consumption by using less salt at the table and substituting alternative flavoring such as herbs, spices, and lemon juice in the preparation of foods. In addition, choices can be made for foods modified to lower sodium content and less frequent choices could be made of foods to which sodium is added in processing and preservation.

Sodium: From Low to High

Just about everything we eat contains some amount of sodium. Be scrupulous about reading food labels: about 40% of the salt in our diet

comes from processed foods. The rest (about 30%) occurs in food naturally or is added at the table (30%). This chart is designed to show some of the often surprising places where sodium is found. Remember that some low sodium foods (especially cheeses, oils, butter, cookies, eggs, etc.) are also high in fat. In this chart, we look at each main food category and classify its members as low, medium, or high in sodium content. These designations are based on an average-sized serving.

Ten Ways to Shake the Salt Habit

- Adjust the seasonings in a recipe to use more nonsalt spices and less salt.
- Use freshly grated citrus peel to perk up the flavor in salads, entrées, and side dishes.
- Experiment with using high-quality, dry white wines in cooked sauces and soup to reduce the need for salt.
- Get out of the habit of salting food before tasting it.
- Splash a bit of vinegar in bean soups, or herbed vinegar on pasta or bean salads to give a robust flavor without salt.
- Substitute a dash of hot-pepper sauce for salt.
- Switch from common table salt to a sodium chloride–potassium chloride blend, such as LiteSalt. Your taste buds won't know the difference. Healthy adults free of heart, kidney, and liver diseases can use salt substitutes containing no sodium at all, but most people find their taste too bitter. These substitutes should be kept out of children's reach.
- Look for low-sodium baking powder in the special food section of the supermarket. Follow package directions to substitute for regular baking powder in recipes.
- Wash that salt away. Studies have shown that rinsing salted canned foods helps remove some of the sodium. Experiment cautiously; see how much rinsing you can do without rinsing away desired flavor.
- Add a pinch of curry powder to tomato sauces and egg dishes. It won't taste like curry in such a tiny amount but will help bring out the food flavor.

SODIUM CONTENT OF FOODS

Food Category	Low	Medium	High
Beans	Any unsalted beans Tofu (bean curd)	Canned bean sprouts	Canned beans
Beef	Most fresh cuts	Fresh liver	Processed products
Breads	Special low-sodium	Most breads and muffins	
Cakes	Fruitcake	Most commercial cakes	
Cereals, cold	100% Natural Frosted Mini-Wheats Puffed rice Puffed wheat Shredded wheat	Most other cereals	
Cereals, hot	Farina (noninstant) Grits (noninstant) Oatmeal (noninstant) Cream of Wheat (noninstant)	Most instant varieties	Instant grits
Cheeses	Dry-curd cottage cheese Natural Swiss	Most natural, hard cheeses	Regular cottage cheese Processed cheeses (American, Velveeta)

Chicken and fowl	Fresh chicken, most cuts Duck or goose Turkey		Processed products
Condiments (about 1 tablespoon or less)	Apple butter Bitters Imitation catsup Garlic clove Horseradish Jams and jellies Mayonnaise Miracle Whip Vinegar	Catsup Mustard Relish Worcestershire sauce	Salt Soy sauce
Cookies (about 1 ounce)	Macaroons Sugar wafers	Most other cookies	
Crackers (about 1 ounce)	Special unsalted Melba toast Zweiback	Most other varieties	
Eggs	Egg white Whole egg		
Fats and oils	Unsalted butter Unsalted margarine Vegetable oils	Butter Margarine Most commercial salad dressings	

SODIUM CONTENT OF FOODS *(Cont.)*

Food Category	Low	Medium	High
Fish and shellfish	Some fresh fish Canned tuna, special low-sodium pack	Many shellfish	Canned fish Many frozen processed products
Frozen desserts	Creamsicle Fudgsicle Popsicle	Ice cream Ice milk	
Fruit	Most canned, dried, frozen, or fresh		
Juices	Most fruit juices—canned, fresh, or from frozen Low-sodium vegetable juice cocktail		Tomato juice Vegetable juice cocktail
Lamb	Fresh cuts		
Milk		Milks, flavored or unflavored	
Nuts and coconut	Most unsalted nuts	Peanut butter Most salted nuts	

Pasta	Egg noodles Macaroni		Canned and some frozen products
Pork	Fresh cuts		Luncheon meats and other processed products
Rice	Converted Instant Unprocessed		Most seasoned products
Soups	Low-sodium varieties		Most varieties
Veal	Most fresh cuts	Fresh liver	
Vegetables	Most fresh and frozen, if unseasoned Some unsalted canned Water chestnuts		Most canned
Yogurt		Most varieties	

Note: *''Low'' foods contain less than 100 mg of sodium per serving. ''Medium'' foods fall into the 100–400-mg range. ''High'' foods exceed the 400-mg level for a typical serving. Those on very strict diets may need to limit their intake of some of the foods in the low column (for instance, items with 70–99 mg per serving). Such individuals should follow professional advice, not assume that ''low'' foods can be eaten in unlimited quantities.*

Alcohol

To reduce the risk for chronic disease, take alcohol only in moderation (no more than two drinks a day), if at all. Avoid drinking any alcohol before or while driving, operating machinery, taking medications, or engaging in any other activity requiring judgment. Avoid drinking alcohol while pregnant.

Alcohol is a drug that can produce addiction in susceptible individuals, birth defects in some children born to mothers who drink alcohol during pregnancy, impaired judgment, impaired ability to drive automobiles or operate machinery, and adverse reactions in people taking certain medications. In addition, alcohol abuse has been associated with disrupted family functioning, suicides, and homicides.

Excessive use of alcohol is also associated with liver disease, some types of cancer, high blood pressure, stroke, and disorders of the heart muscle. Extensive epidemiologic and clinical evidence has identified alcohol consumption as the principal cause of liver cirrhosis in the United States, at least in part as a result of the direct toxic effects of alcohol on the liver. Smoking and alcohol appear to act synergistically to increase the risk for cancers of the mouth, larynx, and esophagus. Less conclusive and somewhat conflicting evidence suggests a role of alcohol in other types of cancers such as those of the liver, rectum, breast, and pancreas.

Studies indicate a direct association between increased blood pressure and the consumption of alcohol at levels beyond about two drinks daily. (One drink is defined as a 12-ounce beer, a 5-ounce glass of wine, or 1½ fluid ounces [one jigger] of distilled spirits, each of which contains about 1 ounce of alcohol.) Extremely excessive alcohol consumption is associated with cardiomyopathy. Alcohol consumption by the mother during pregnancy has also been associated with fetal malformations.

Although consumption of up to two drinks per day has not been associated with disease among healthy men and nonpregnant women, surveys suggest that at least 9 percent of the total population consumes two or more drinks per day and those in this group need to reduce their alcohol consumption. A threshold level of safety for alcohol intake during pregnancy has not been established. Thus, pregnant women and women who may become pregnant should avoid drinking alcohol.

Fluoride

Community water systems should contain fluoride at optimal levels for prevention of tooth decay. If such water is not available, use other appropriate sources of fluoride.

The most efficient means of making fluoride available to the general public to reduce dental disease is through drinking water. Numerous epidemiologic and clinical studies have attested to the efficacy, safety, and cost effectiveness of systemic fluoride in the prevention of tooth decay. Lifetime use of water containing an optimal fluoride concentration of approximately 1 part per million has been shown to reduce the prevalence of dental caries by more than 50 percent. Water fluoridation is considered one of the most successful public health efforts introduced in the United States.

For children living in areas with inadequate concentrations of fluoride in the water, supplementary fluoride sources should be used at dosages that depend on the fluoride content of the local water supply and the age of the child. The effectiveness of prenatal fluoride administration, however, is uncertain because clinical studies of its effects on subsequent caries incidence have been equivocal. Excessive fluoride should be avoided because it may cause mottling of developing teeth.

Sugars

Those who are particularly vulnerable to dental caries (cavities), especially children, should limit their consumption and frequency of use of foods high in sugars.

Although genetic, behavioral, and other dietary factors also influence dental health, the major role of sugars in promotion of tooth decay is well established from animal, epidemiologic, clinical, and biochemical studies. Newly erupting teeth are generally more vulnerable to decay than mature teeth.

Research has shown that three conditions must exist for the formation of dental caries: the presence of fermentable carbohydrate, acid-producing bacteria, and a susceptible tooth. Caries-producing bacteria metabolize a range of sugars (glucose, fructose, maltose, lactose, and

sucrose) to acids that demineralize teeth. The unique role of sucrose (common table sugar) in dental caries is related to its special ability to be converted by these bacteria into long, complex molecules that adhere firmly to teeth and form plaque.

The most important diet-related interventions are flouridation of drinking water, or the use of other means of fluoride administration, and control of intake of sugars. While fluoride is the most important factor overall in dental caries prevention, reduction in the frequency of consumption and in the quantity of sugar-rich foods in the diet will also help reduce decay. Sticky sweet foods that adhere to the teeth are more cariogenic than those that wash off quickly. The longer cariogenic foods remain in the mouth, the more they are likely to increase the initiation and progression of tooth decay.

Calcium

Adolescent girls and adult women should increase consumption of foods high in calcium, including low-fat dairy products.

Inadequate dietary calcium consumption in the first three or four decades of life may be associated with increased risk for osteoporosis in later life. Osteoporosis, a chronic disease characterized by progressive loss of bone mass with aging, occurs in both women and men, although postmenopausal women are twice as likely as men to have severe osteoporosis with consequent bone fractures. Evidence shows that chronically low calcium intake, especially during adolescence and early adulthood, may compromise development of peak bone mass. In postmenopausal women, the group at highest risk for osteoporosis, estrogen replacement therapy under medical supervision is the most effective means to reduce the rate of bone loss and risk for fractures. Maintenance of adequate levels of physical activity and cessation of cigarette smoking have also been associated with reduced osteoporosis risk.

Although the precise relationship of dietary calcium to osteoporosis has not been elucidated, it appears that higher intakes of dietary calcium could increase peak bone mass during adolescence and delay the onset of bone fractures later in life. Thus, increased consumption of foods rich in calcium may be especially beneficial for adolescents and young women. Food sources of calcium consistent with other dietary recom-

mendations in this Report include low-fat dairy products, some canned fish, certain vegetables, and some calcium-enriched grain products.

This chart is designed to illustrate good sources of calcium. Remember that some of these calcium-rich foods may also be high in fat (cheeses, ice cream, whole milk products) or sodium (herring). If you do choose one of these items, remember to adjust the rest of your diet accordingly, or look for low-fat versions (low-fat cottage cheese, for example).

FOOD SOURCES OF CALCIUM

Good	Better	Best
⅓ cup almonds	1 serving entrée or vegetable with cheese	1 cup low-fat yogurt (added milk solids)
8 ounces baked beans (1 small can)	1 cup ice milk or frozen yogurt	1 cup milk (skim, low-fat, or whole)
1 bean burrito	1 ounce hard cheese (¼ cup shredded, or 1½-inch cube)	½ cup mackerel
1 serving cocoa from mix	1 cup turnip greens	1 can herring steaks
1 fudgsicle	1 cup bok choy	1 cup collard greens
½ cup oysters	⅔ cup pink salmon with bones	⅔ cup red salmon with bones
1 cup broccoli	1 fast-food milkshake	1 can sardines with bones
1 cup okra	½ cup ricotta cheese	1 cup Calcimilk
1 cup creamed cottage cheese	1 cup plain, whole-milk yogurt	1 ounce Dairy Crisp cereal
2 tablespoons crumbled blue cheese		
1 slice processed cheese (American, Velveeta)		
4 ounces shrimp (about 1 small can)		

FOOD SOURCES OF CALCIUM *(Cont.)*

Good	Better	Best
4 ounces scallops		
1 cup ice cream		
1 cup soybeans		
4 ounces tofu		
1 cup beet greens		
1 wedge Camembert cheese		
1 cup kale		
1 cup mustard greens		

Note: *''Good'' foods provide about 10–20% of the RDA; ''better'' in the 20–30% range; ''best'' above 30%.*

Cooking with Calcium in Mind

Even if you can't get all the calcium you need from your diet, chances are that you can boost its calcium count significantly. Here are some suggestions:

- Substitute frozen yogurt for ice cream. There are more products than ever to choose from, and they offer more calcium, fewer calories, and less fat than ice cream.
- Make a delicious dip that is far more healthful than sour cream by allowing low-fat yogurt to drain in a cheesecloth or paper coffee filter placed in a plastic cone. Vary the flavor with seasonings, or enjoy as is with crackers.
- For a little extra calcium, skim or low-fat milk that is ''protein-fortified'' is available in the dairy section. Because nonfat milk solids are used to fortify the milk, it has extra calcium. A new

calcium-fortified milk is also available that provides about 200 mg of extra calcium per cup.

- Keep nonfat dry-milk powder handy near the stove. Stir into soups and hot foods, or sprinkle onto food at the table.
- Eat the tiny bones that come with canned fish like salmon and sardines. The bones in tiny sardines are far less noticeable than those in larger ones.
- Don't forget vegetable sources of calcium: bok choy, broccoli, collard greens, kale, turnip greens—and even seaweed.
- Discover soy foods, like tofu, which have many nutritional attributes, a respectable calcium count among them. If you find tofu too bland, you can substitute it for just some, not all, of the meat in your favorite stir-fries or pasta recipes.

Iron

Children, adolescents, and women of childbearing age should be sure to consume foods that are good sources of iron, such as lean meats, fish, certain beans, and iron-enriched cererals and whole grain products. This issue is of special concern for low-income families.

Dietary iron deficiency is responsible for the most prevalent form of anemia in the United States. Iron deficiency hampers the body's ability to produce hemoglobin, a substance needed to carry oxygen in the blood. A principal consequence of iron deficiency is reduced work capacity, although depressed immune function, changes in behavior, and impaired intellectual performance may also result. Because of the serious consequences of iron deficiency, continual monitoring of the iron status of individuals at high risk—particularly children from low-income families, adolescents, and women of childbearing age—is vital, as is treatment of those identified to be iron deficient.

Proper infant feeding—preferably breastfeeding, otherwise use of iron-fortified formula—is the most important safeguard against iron deficiency in infants. Among adolescents and adults, iron intake can be improved by increasing consumption of iron-rich foods such as lean

meats, fish, certain kinds of beans, and iron-enriched cereals and whole grain products. Also, consuming foods that contain vitamin C increases the likelihood that iron will be absorbed efficiently.

Be alert to other implications in this chart of iron-rich foods. Some good iron sources may be high in fat (ham, duck, goose, coconut milk, nuts, braunschweiger) or salt (pork and beans, chipped beef). Adjust your diet accordingly. Balance over your entire diet is essential.

Keeping an Eye Out for Iron

New research has brought us new insights on iron. Here are some new ways—along with some tried and true methods—to keep your iron nutrition where you want it.

- Keep in mind that vitamin C is iron's best friend. This familiar vitamin helps you absorb the iron in vegetables, fruits, nuts, and cereals. So remembering good sources of vitamin C will also help your iron intake.
- Include small amounts of meat, poultry, and fish in your diet to aid iron absorption. These foods aren't essential for good iron nutrition, but eating even the tiniest amount does have an enhancing effect on iron absorption.
- Choose an iron-fortified breakfast cereal. This is a simple way to insure a good iron intake. Some are also high in fiber and low in sugar—two more pluses.
- Go easy on the tea and coffee if you're having trouble with iron nutrition. Both may inhibit the absorption of iron, but tea has the worse record on this count. If cutting them out is impossible, allow at least an hour to elapse between consuming iron-rich foods and drinking coffee or tea. In other words, have coffee and tea as a snack, rather than with the meal.
- Cook in iron pots. Especially when acidic ingredients like tomato are present, some of the iron will be absorbed into the food.

FOOD SOURCES OF IRON

Good

1 8-ounce can pork and beans
2 ounces dried chipped beef
4 ounces fresh beef
4 ounces ham or fresh, lean pork
1 large sandwich roll
4 ounces roast duck
1 veal chop
1 cup black-eye peas
2 tablespoons sturgeon caviar
4 ounces roast goose
4 ounces sardines, oil-pack
4 ounces steamed scallops
1 cup Cheerios
4 ounces lean, fresh veal
1 cup coconut milk
1 cup lentils
½ cup cashews
⅔ cup any of the following cereals: Crispy Wheats 'n Raisins, Golden Grahams, Grape-Nuts Flakes,

Better

1 cup most childrens' cereals
⅔ cup any of the following cereals: 40% Bran, Fruit & Fibre, Life, Wheat Chex
⅓ cup Bran Buds or Post Granola
1 packet Quaker Instant Oats
1 cup kidney, lima or great northern beans
1 cup canned clams
1 cup cooked soybeans
1 cup farina
2 slices braunschweiger
4 ounces cornish hen
⅔ cup regular or quick Cream of Wheat
½ cup dried peaches
½ cup sunflower seeds
1 cup King Vitamin cereal
⅔ cup Buc Wheats cereal

Best

1 cup Kix
1 cup Body Buddies
⅔ cup instant Cream of Wheat
1 packet Mix 'n Eat Cream of Wheat
1 cup chicken, beef, or calf liver
⅔ cup Corn Total or Total
⅔ cup Product 19
⅔ cup Most cereal

FOOD SOURCES OF IRON *(Cont.)*

Good	Better	Best
Honey Bran, Raisins, Rice & Rye, Special K, Wheaties	½ cup pumpkin seeds	
½ cup chopped almonds		
½ cup chopped, black walnuts		
½ cup dried apricots		

Note: *''Good'' sources provide about 20–30% of the RDA for iron per serving. ''Better'' sources supply amounts in the 30–50% range. ''Best'' sources contain more than 50% of the RDA in the serving size listed.*

EDUCATING THE AMERICAN CONSUMER

Educating the public about the dietary choices most conducive to prevention and control of certain chronic diseases is essential. Educational efforts should begin in primary school and continue throughout the secondary grades, and should focus on the dietary principles outlined in this Report—the potential health benefits of eating a diet that is lower in fat (especially saturated fat) and rich in complex carbohydrates and fiber. The importance of adequate physical activity should also be stressed. Efforts should continue throughout each stage of life to promote the principles outlined in the *Dietary Guidelines for Americans*.

Special Populations

A disproportionate burden of diet-related disease is borne by subgroups in our population. Black Americans, for example, have higher rates of

high blood pressure, strokes, diabetes, and other diseases associated with obesity (but lower rates of osteoporosis) than the general population. Some groups of Native Americans exhibit the highest rates of diabetes in the world. Pregnant and lactating women also have special nutritional needs. Particular effort should be made to identify and remove the barriers to optimal health and nutritional status in such high-risk groups, using methods that take into consideration their diverse cultural backgrounds.

Many older persons suffer from chronic diseases that can reduce functional independence; many take multiple medications that may adversely interact with nutrients. Sound public education directed toward this group—and professional education directed toward individuals who care for older Americans—should focus on dietary means to reduce risk factors for chronic disease, to promote functional independence, and to prevent adverse consequences of use of medications.

Health Professionals

Improved nutrition training of physicians and other health professionals is needed. Training should emphasize basic principles of nutrition, the role of diet in health promotion and disease prevention, nutrition assessment methodologies and their interpretation, therapeutic aspects of dietary intervention, behavioral aspects of dietary counseling, and the role of dietitians and nutritionists in dietary counseling of patients.

Food Labels

Food labeling offers opportunities to inform people about the nutrient content of foods so as to facilitate dietary choices most conducive to health. Food manufacturers should be encouraged to make full use of nutrition labels. Labels of processed foods should state the content of calories, protein, carbohydrate, fats, cholesterol, sodium, and vitamins and minerals. To the extent permitted by analytical methods, manufacturers should disclose information where appropriate on the content of saturated and unsaturated fatty acids and total fiber in foods that normally contain them. Descriptive terms such as ''low calorie'' and ''sodium reduced'' in compliance with the Food and Drug Administration's regulations for food labeling may also be helpful, and the expanded use of these terms should be encouraged.

Nutrition Services

Health care programs for individuals of all ages should include nutrition services such as, when appropriate, nutrition counseling for individuals or groups, interpretation and implementation of prescribed therapeutic diets tailored to individual food preferences and lifestyle, referral to appropriate community services and food assistance programs, monitoring of progress, and appropriate followup. These services should routinely incorporate assessment of nutritional status and needs based on established criteria to identify individuals with nutrition risk factors who would profit from preventive measures and those with nutritional disorders who need remedial care.

Food Services

Lack of access to an appropriate diet should not be a health problem for any American. Wherever food is served to people or provided through food assistance programs, it should reflect the principles of good nutrition stated in this Report. Whether served in hospitals, schools, military installations, soup kitchens, day care centers, or nursing homes, or whether delivered to homes, food service programs offer important opportunities for improving health and providing dietary education. Such programs should pay special attention to the nutritional needs of older people, pregnant women, and children, especially those of low income or with other special dietary needs. Because a large proportion of the population takes meals in restaurants and convenience food facilities, improvements in the overall nutritional balance of the meals served in such places can be expected to contribute to health benefits.

Food service programs should also take particular care to ensure that special diets lower in fat, especially saturated fat, are provided to people with elevated blood cholesterol, heart disease, or diabetes; that diets low in sodium are provided to individuals with high blood pressure; and that protein-restricted diets are made available to people with end-stage kidney disease.

Food Products

The public would benefit from increased availability of foods and food products low in calories, total fat, saturated fat, cholesterol, sodium, and sugars, but high in a variety of natural forms of fiber and, perhaps, certain minerals and vitamins. Food manufacturers can contribute to improving the quality of the American diet by increasing the availability

of palatable, easily prepared food products that will help people to follow the dietary principles outlined here. Because the public is becoming increasingly conscious of the role of nutrition in health, development of such products should also benefit the food industry.

Research and Surveillance

Impressive evidence already links nutrition to chronic disease. However, much more information is needed to continue to identify changes in the national diet that will lead to better health for the Nation. Gaps in our knowledge of nutrition suggest future research and surveillance needs. Examples are:

- The role of specific dietary factors in the etiology and prevention of chronic diseases.
- The childhood dietary pattern that will best prevent later development of chronic diseases.
- The effects of maternal nutrition on the health of the developing fetus.
- The nutrient and energy requirements of older adults.
- How nutrient requirements translate into healthful dietary patterns.
- The development of biochemical markers of dietary intake to monitor better the effects of dietary intervention.
- The identification of effective educational methods to translate dietary recommendations into appropriate food choices.
- The establishment of a nutrition surveillance system that will enhance the monitoring of population-specific and State-specific trends in the occurrence of nutrition-related risk factors and conditions.

II

IMPLICATIONS FOR PUBLIC HEALTH POLICY*

CORONARY HEART DISEASE

High blood cholesterol is one of the three major modifiable risk factors for coronary heart disease (CHD). The principal nutritional factors identified with high blood cholesterol and the development of CHD are dietary fat, particularly saturated fatty acids and cholesterol, and energy imbalance leading to obesity. Other dietary constituents, such as fiber and alcohol, may interact with these factors in ways that are not clearly understood.

The relationship of dietary fat and cholesterol to CHD is supported by extensive and consistent clinical, epidemiologic, metabolic, and animal evidence. These studies strongly indicate that the formation of atherosclerotic lesions in coronary arteries—contributing to the risk for CHD—is increased in proportion to levels of total and LDL (low density lipoprotein) cholesterol in blood, which, in turn, are increased by diets high in total and saturated fat but decreased by diets containing polyunsaturated and/or monounsaturated fat. International epidemiologic comparisons and migration studies have revealed strong associations of fat, especially saturated fat, intake to development of elevated blood cholesterol levels, atherosclerosis, and CHD. Evidence from studies within a given population has been less consistent but points in a similar direction. Dietary intervention trials in men with elevated blood cholesterol levels have demonstrated small but significant proportionate improvements such that each 1 percent reduction in total blood cholesterol is accompanied by about a 1.5 percent reduction in heart disease risk. Intervention to lower elevated blood cholesterol levels has been

*This material is taken from the concluding sections of chapters 2 through 19 of the full Report.

shown in both human and animal studies to reduce CHD risk and to slow lesion progression. Animal studies have show lesion regression, and there is suggestive evidence from some clinical studies that this also occurs in humans.

Taken together, these studies provide strong support for recommendations for an overall considerable decrease in dietary fat intake by the general public from the present level of 37 percent of total caloric intake and decrease in saturated fat from the present level of about 13 percent of total caloric intake.

Although the effect of dietary cholesterol on blood cholesterol is somewhat weaker and more variable among individuals than that for dietary saturated fatty acids, a reduction in the amount of cholesterol consumed by the general public from present average levels of approximately 305 mg/day for women and 440 mg/day for men seems appropriate.

Obesity is associated with such CHD risk factors as elevated LDL and total blood cholesterol, lower HDL (high density lipoprotein) cholesterol, high blood pressure, and diabetes mellitus. It is also a significant independent predictor of CHD, especially in women and in persons under age 50. Thus, current evidence suggests that an overall decrease in the prevalence and severity of overweight in the population, through both a decrease in caloric intake and an increase in caloric expenditure, is advisable on the basis of the relationship of obesity to heart disease risk.

Studies of animal protein, coffee, and sugar have shown variable associations with increased blood lipid levels, but present evidence of their relationship to CHD, if any, is too weak and insufficient to draw implications for changes in the consumption of these substances. Likewise, evidence from some studies that certain components of dietary fiber and omega-3 fatty acids from fish oils reduce blood cholesterol levels and heart disease risk is too preliminary to recommend changes in average intake of these substances. In addition, advice concerning vitamin and mineral supplements on the basis of their relationship to CHD is unwarranted.

Special Populations

There is a need to identify those individuals with high cholesterol levels, who are therefore at greatest risk. For individuals whose high total and LDL cholesterol levels warrant treatment, the first line of intervention

is diet therapy. The recently released National Cholesterol Education Program guidelines on the treatment of high blood cholesterol in adults recommend that intensive dietary treatment should generally be carried out for at least 6 months. As indicated in this Report, only after that period of time, and if the cholesterol level remains significantly high, should the addition of drugs to the dietary regimen be considered. Even then, continuation of diet therapy can reduce the need for drugs and thus their risk of side effects and cost. Furthermore, studies in persons with CHD suggest that diets low in fat, saturated fat, and cholesterol can retard the progression of the disease, including recurrent heart attacks, and perhaps induce regression of atherosclerotic lesions. Persons with such high blood cholesterol levels should receive dietary guidance by qualified health professionals.

Adults with cholesterol levels of 240 mg/dl or above (whose LDL cholesterol levels are also significantly elevated), and those with total cholesterol levels of 200 to 239 mg/dl with CHD or two or more CHD risk factors should begin a program of supervised dietary treatment. The NCEP guidelines recommend starting dietary therapy with a step-one diet, in which the intake of total fat is less than 30 percent of calories, saturated fat is less than 10 percent of calories, and cholesterol is less than 300 mg/day. If after 3 months on this diet cholesterol lowering is insufficient, the person should progress to a step-two diet, in which saturated fat is further reduced to less than 7 percent of total calories and cholesterol intake is further reduced to less than 200 mg/day.

Although in epidemiologic studies light to moderate alcohol consumption is associated with reduced heart disease risk, a cause-and-effect relationship has not been proved. Since heavy drinking has numerous adverse health consequences (see chapters on maternal and child nutrition and on alcohol), including several on the cardiovascular system, the use, even in moderate quantities, of alcohol for its possible beneficial effects on CHD is not recommended.

Food Labels and Food Products

Evidence related to the role of dietary factors in CHD supports the need for manufacturers to increase the number of food labels with their total fat, fatty acids, and cholesterol content. Manufacturers should also be encouraged to increase availability of foods and food products that are low in fat, saturated fat, and cholesterol.

Food Services

Evidence related to the role of dietary factors in CHD suggests that the public would benefit from increased availability of foods low in fat, saturated fat, and cholesterol in food service programs. The need is critical for the one in four persons with cholesterol levels that put them at appreciably high risk for CHD.

Dietary Counseling

Persons with high blood cholesterol and their food preparers should be given access to counseling by qualified health professionals and assistance in the development of diets low in fat, saturated fat, and cholesterol as well as in the appropriate balance of caloric intake and expenditure. Education and training opportunities for health professionals should be expanded to meet this need.

Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in CHD should include investigations into:

- The identification and management of individuals with high blood cholesterol in the general population.
- The most effective educational and dietary intervention strategies to reduce blood lipid levels and heart disease risk.
- Improved methods for assessing American dietary patterns in relation to CHD risk.
- Refinement of current dietary recommendations, including evaluation of other potentially efficacious dietary regimens, evaluation of dietary fiber, and optimal intakes of omega-3 and omega-6 fatty acids to prevent CHD.
- The mechanisms by which alterations in dietary fatty acids affect atherogenesis and the risk for CHD, including degree of saturation, chain length, and fatty acid series.
- Clarification of the role of dietary cholesterol in atherogenesis, including variability in response, effects on cholesterol metabolism in both fasting and postprandial states, and interactions of postprandial lipoproteins and lipoprotein remnants with cells of the arterial wall.

HIGH BLOOD PRESSURE

Dietary factors that clearly contribute to high blood pressure include obesity and excessive intake of sodium and alcohol. The average daily sodium consumption of 4 to 6 grams by adult Americans is substantially above the National Research Council's recommended range of 1.1 to 3.3 grams for safe and adequate intake and is 5 to 10 times higher than the amount required. Many individuals are able to maintain normal blood pressure levels over a large range of sodium intake; the lack of known harm from moderate sodium restriction, however, and the potential benefit to people whose blood pressures rise with increased sodium intake suggest that those who ingest excess sodium—most Americans—should consider reducing their dietary sodium intake.

The strong association between obesity and hypertension and the demonstrated reduction in blood pressure that occurs with weight loss suggest that maintenance of desirable body weight should be a goal for the population.

Similarly, there is a direct association between blood pressure and alcohol consumption beyond about two standard-sized drinks daily. (One standard-sized drink is defined as 12 ounces of regular beer, 5 ounces of wine, or 1½ ounces of distilled spirits.)

Some evidence indicates that a reduction in blood pressure is associated with increased dietary intake of potassium, calcium, magnesium, and fiber. This evidence is, as yet, too preliminary to recommend increased intake of these factors for the general population for the purpose of hypertension control. Likewise, although increased intake of certain lipids (e.g., omega-6 or omega-3 polyunsaturated fatty acids) may decrease blood pressure, additional research is needed before any recommendations can be made.

Special Populations

Achieving and maintaining desirable body weight and moderating sodium and alcohol intake can lower blood pressure in patients with mild and moderate hypertension and reduce the need for antihypertensive medications. Such patients should be informed of the likely benefit of these dietary practices, along with the importance of adequate caloric expenditure through exercise, and the moderation of fat intake, especially saturated fatty acids, to reduce high blood cholesterol levels and the risk for heart attack.

Food Labels and Food Products

Evidence related to the role of dietary factors in hypertension supports the need for nutrition labeling on a wide selection of foods so that the consumer has the option of choosing foods with known amounts of calories and sodium. Food manufacturers should continue to reduce sodium in products and continue the research and development of products low in calories and sodium.

Food Services

Food service programs should provide adequate choices of foods that provide essential nutrients and energy to maintain desirable body weight and should include foods that are low in sodium.

Dietary Counseling

Counseling and assistance in the selection and preparation of foods low in sodium and calories and assistance with the development of dietary patterns that control energy, sodium, and alcohol should be available to individuals whose blood pressure places them in the mild-to-moderate as well as high range of hypertension.

Research and Surveillance

Special priority is attached to the following research and surveillance tasks related to the role of diet in hypertension:

- Development of practical methods for the rapid and reliable identification of individuals at high risk for hypertension because they are salt sensitive.
- Investigation of the interactions of sodium with other nutrients—such as potassium, calcium, chloride, magnesium, fatty acids, and fiber—in influencing blood pressure.
- Investigation of the role of specific dietary factors, including potassium, calcium, fatty acids, fiber, amino acids, trace elements, and alcohol, in the cause and potential prevention of hypertension and the mechanisms for these effects.
- Investigation of the mechanism of obesity-associated hypertension and determination of the ratio of fat to lean body mass that might prevent development of hypertension.

CANCER

The dietary factors elevated for the possible relationship to cancer risk are fat, calories, fiber, foods high in vitamin A and carotenoids, and alcohol. Roles for vitamin C, vitamin E, selenium, protein, and salt-cured, salt-pickled, and smoked foods have been proposed.

Studies of carcinogen-induced tumorigenesis in experimental animals and international epidemiologic comparisons have provided substantial but not conclusive evidence that dietary fat increases the risk for cancers of the breast, colon, rectum, endometrium, and prostate. The results of epidemiologic investigations within more homogeneous population groups, however, are inconsistent. Because fat contains more than twice the calories per given quantity of protein or carbohydrate, high-fat diets are generally high in calories. Despite such complications, the animal and international epidemiologic data suggest that a decrease in fat consumption by the general public from the current 37 percent of total caloric intake might reduce the risk for certain cancers.

Results from animal and human studies of obesity and cancer are not wholly consistent, perhaps because of the difficulty of separating the effects of calories, fat, and body weight. Furthermore, the level of caloric restriction that seems effective in preventing cancer in most animal studies is at a food intake level not advisable for most humans. Consistent with other health recommendations, maintenance of desirable weight is recommended and may potentially decrease the risk of breast, colon, prostate, and endometrial cancers.

Correlational epidemiologic studies suggest an association between diets low in fiber and increased risk for colon cancer, while results from case-control studies are mixed. Studies in experimental animals indicate that further research is needed on the effects of different types of fiber. While inconclusive, evidence suggests that an overall increase in intake of foods high in fiber might decrease the risk for colorectal cancer. Despite the need for additional evidence, this recommendation is consistent with guidance for reducing gastrointestinal disease.

Likewise, epidemiologic studies provide suggestive evidence that consumption of foods containing carotenoids, including the beta-carotene precursor of vitamin A, protects against development of epithelial cell cancers such as those of the oral cavity, bladder, or lung. These studies have generally shown lower rates of cancer among individuals consuming the highest overall levels of vitamin A, carotenoids, or fruits

and vegetables. These studies have not distinguished the specific form of vitamin A associated with protection, nor have they ruled out the possibility of protection from as yet unidentified components of fruits and vegetables. Until the results of clinical trials examining these relationships become available, an increase in consumption of fruits and vegetables might benefit persons who now consume below-average amounts of these foods. There is no evidence that vitamin A in amounts greater than the RDA is beneficial.

Despite some difficulties in distinguishing the cancer-producing effects of excessive alcohol intake from those of cigarette smoking, evidence suggests that a reduction in alcohol intake among the portion of a population that drinks most heavily would help to reduced the prevalence of cancers of the mouth, esophagus, pharynx, and perhaps other sites.

Excessive selenium intake is toxic. This fact and limitations in information about selenium intake in the general population suggest that selenium intake should not be increased above levels now in the average diet.

Although some epidemiologic studies suggest an association between dietary protein and cancer incidence, these studies are limited and not consistently supported by animal evidence. Thus, the evidence does not justify a recommendation to the general public to decrease protein on the basis of its relationship to cancer.

There is some suggestive but not conclusive evidence that correlates consumption of salt-pickled, salt-cured, and smoked foods with stomach and esophageal cancers, indicating that the public should continue to limit its intake of these foods to the current low levels of consumption.

Special Populations

Persons at high risk for diet-related cancers because of family history, obesity, or excessive alcohol intake should receive counseling from qualified health professionals to design approaches that could reduce their elevated risk for cancer.

Patients with cancer should receive appropriate nutritional support and dietary advice to maintain optimal nutritional status throughout medical, surgical, or radiological therapy. There is no credible evidence that nutritional changes specifically help in the cure of cancer patients.

Children and older persons are not currently targeted by the dietary guidelines relative to cancer risk due to limited data for these groups.

Food Labels and Food Products

Evidence related to the role of dietary facts in cancer suggests that food manufacturers should include on package labels information about nutritional content of the food, especially for fat and carbohydrate components (and including fiber components to the extent permitted by analytical methods). Foods low or reduced in calories and fat and high in fiber should be made increasingly available by food manufacturers.

Food Services

Evidence related to the possible role of dietary factors in cancer suggests that the public might benefit from increased availability of foods low in fat and high in fiber.

Dietary Counseling

Persons with cancer should be provided with counseling and assistance in the development of diets appropriate to their condition.

Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in cancer should include investigations into:

- Molecular mechanisms of carcinogenesis and the ways in which initiating or promoting events may be affected by specific components of dietary fat, fiber, protein, alcohol, vitamin A, carotenoids, and other vitamins or minerals.
- Quantitative relationships between food and nutrient intake and cancer incidence through chemoprevention and dietary clinical trials.
- The effect of specific components of dietary fat, fiber, vitamin A, and carotenoids on cancer etiology.
- Interactions between dietary factors such as fat, fiber, calories, protein, and specific vitamins and minerals in cancer prevention and causation.
- Development of biochemical markers of dietary intake to better monitor effects of dietary intervention on cancer risk.
- Patterns of food intake best associated with cancer prevention.

- Development of national population data on food and nutrient consumption patterns and specific cancer rates, including more accurate assessment of intake of specific dietary factors within relatively homogeneous population groups.
- Levels of carcinogenic and mutagenic substances in the food supply.
- Dietary guidance methods that are most effective in helping people improve patterns of food intake.
- The cause of wasting and malnutrition in cancer patients and the effects of nutritional support on response to therapy and survival in these patients.

DIABETES

Obesity greatly increases the risk for developing Type II diabetes, and obesity is in turn related to caloric imbalance: excessive intake of energy and/or insufficient energy expenditure. Because dietary fat contains more than twice the calories of either protein or carbohydrate, a reduction in fat intake should lead to a more favorable caloric balance, especially when this dietary change is accompanied by appropriate levels of physical activity. Controlling obesity by reducing dietary fat intake should help reduce the prevalence of Type II diabetes and is also consistent with dietary recommendations for the prevention of coronary heart disease, hypertension, and some types of cancer.

Special Populations

Overweight persons with Type II diabetes benefit substantially from weight loss and may accrue benefits when fat, salt, alcohol, and simple sugars are reduced in combination with an appropriate increase in foods containing complex carbohydrates and soluble fiber. Even moderate weight loss, accomplished by reducing caloric intake and increasing energy expenditure, reduces blood glucose and insulin toward normal levels.

Current research suggests that diets relatively low in fat and cholesterol, salt, and protein can reduce the risk of the long-term cardiovascular, hypertensive, and renal complications of diabetes, respectively.

Persons with diabetes and concurrent insulin-induced hypoglycemia, neuropathy, or poor metabolic control should avoid alcohol. Although research has not unequivocally established that complex carbohydrates and fiber improve blood glucose and insulin levels in individuals with diabetes, diets higher in these substances are generally lower in fat, cholesterol, and calories, and they are associated with lower blood lipid levels and, therefore, lower risk for coronary heart disease. Such diets can help reduce high blood cholesterol levels and the risk for coronary heart disease. Until similar uncertainties about the metabolic effects of sugar in persons with diabetes are resolved, prudence dictates caution in the amount of its use. Research on dietary manangement of Type I diabetes emphasizes the importance of weight maintenance, avoidance of hypoglycemia, and metabolic control by coordinating caloric intake and expenditure with the schedule of insulin administration. Information, counseling, and followup on the appropriate application of these dietary principles and guidance for dietary management should be provided to persons with diabetes by qualified health professionals.

Food Labels

The food industry should be encouraged to provide nutritional information on the labels of most food products. The information on calories, fat (especially saturated fat), and other nutrient content will help the public to control caloric intake and will help persons with diabetes to make the necessary dietary modifications their physicians recommend.

Food Services

Evidence related to the role of dietary factors in diabetes currently holds no special implications for policy changes in food service programs.

Dietary Counseling

Persons with diabetes of either type should be provided with counseling and assistance with dietary changes to control their disease. This should be coordinated with other aspects of their health care needs, such as insulin administration and levels of physical activity.

Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in diabetes should include investigations into:

- The role of calorie intake and physical activity, and subsequent weight control, in the prevention of Type II diabetes.
- The metabolic consequences of obesity.
- The metabolic mechanisms of intestinal and hepatic processing of dietary carbohydrate, and the effects of other nutrients and of fiber on carbohydrate metabolism.
- The influence of dietary carbohydrates on glycemic responses in persons with diabetes, and the effects of such responses on development of the cardiovascular, renal, retinal, and neurologic complications of this condition.
- The influence of specific dietary factors—fat, cholesterol, sugar, protein, fiber—on development of the cardiovascular, renal, retinal, and neurologic complications of diabetes.
- The long-term risks and benefits of non-nutritive sweeteners as aids to adherence to dietary regimens.
- The behaviorial and environmental factors that influence adherence to weight loss and dietary regimens in persons with diabetes.
- The specific educational techniques that will improve acceptance of and adherence to therapeutic regimens.

OBESITY

Excess weight or overweight occurs when too few calories are expended and too many consumed for individual metabolic requirements. The extraordinarily high prevalence of obesity in the United States—one-fourth of American adults are overweight and nearly one-tenth are severely overweight—coupled with its role as a risk factor for diabetes, hypertension, coronary artery disease and stroke, gallbladder disease, and some types of cancer, suggests that a reduction in the average weight of the general population would improve the Nation's health. Americans, in general, would benefit from a lifestyle that includes more physical activity and a diet containing fewer calories.

Because fat contains more than twice the caloric value per gram of either protein or carbohydrate, the general public would benefit from

reduced fat intake. In addition, it may be difficult to meet essential vitamin and mineral requirements on low-calorie diets. Because sugar and alcohol provide calories from carbohydrates but no other nutrients, individuals seeking to attain and maintain desirable body weight should use these substances sparingly.

Evidence indicates that exercise burns calories, increases the proportion of lean to fat body mass, and, therefore, raises the metabolic rate. Therefore, increased levels of physical activity are important for attaining desirable body weights among the general population.

Special Populations

Qualified health professionals should evaluate overweight persons for the presence of chronic disease risk factors—especially elevated blood cholesterol, blood glucose, or blood pressure. Such evaluation is important for individuals whose excess body fat is distributed mainly on the abdomen. This pattern is more typical for men than for women, and it increases risks for diabetes, high blood pressure, hyperlipidemia, and heart attacks.

Health professionals should work with obese persons to restrict caloric intake and to increase caloric expenditure. Such advice should also be provided to overweight persons, with or without other significant risk factors, to help reduce their risk for heart disease, stroke, some kinds of cancers, and many other diseases and to prevent or reduce psychosocial complications of obesity. Professional guidance is recommended because many popular means to reduce weight may themselves pose risks to health and because unsupervised efforts to control obesity usually fail over the long term. Although excess body fat is difficult to lose, current research suggests that long-term individual or group programs that facilitate behavioral changes in diet and exercise are most likely to be effective. The intensity of these programs and the precise goal for weight loss should depend on the patient's degree and distribution of overweight, weight history, chronic disease risk factors, health status, and personal choices.

Current evidence is insufficient to recommend similar programs for overweight children. Obesity in infancy and childhood increases the risk for adult obesity, but most overweight children will not become obese. Because no method now exists to predict which children will develop obesity as adults, because research has not yet identified effective methods to prevent adult obesity, and because children require

adequate energy and nutrients to develop and grow normally, low-calorie diets should not be generally recommended for this group. Instead, they should be reserved for children with elevated risk factors for chronic disease. For most overweight children and their families, qualified health professionals should provide counseling and assistance in developing diets that contain adequate, but not excessive, calories and social and physical activities in which the child enjoys participating.

Food Labels and Food Products

Evidence related to the role of diet in obesity indicates that calorie information should be provided on most food product labels. The food industry should continue to develop food products low in calories and with adequate nutrient content.

Food Services

Evidence related to the role of diet in obesity suggests that service programs should include a variety of foods low in calories in their menus.

Dietary Counseling

Overweight patients should be provided with counseling and assistance in the development of diets low in calories and high in essential nutrients, as well as lifestyle modifications that include high levels of physical activity to achieve appropriate weight goals.

Research and Surveillance

Research and surveillance issues of special priority related to the role of nutrition and exercise in obesity and weight management should include investigations into:

- Determination of ideal or desirable body weights for individuals or for the population of various ages.
- Determination of the health risks associated with various degrees of overweight in children and adults.
- Identification of an effective means to measure total body fat and its regional distribution in individuals and in the population.

- Identification of the types of obesity most associated with increased chronic disease risk.
- The contribution of genetic and metabolic factors to obesity, including the molecular and genetic basis of energy metabolism and the nature of genetic aberrations in human obesity.
- The effects of diet, exercise, and weight loss on metabolism and thermogenesis.
- The effects of physical activity on maintenance of desirable body weight.
- The identification of dietary, behavioral, environmental, or genetic factors that predict development of obesity or the ability to lose weight successfully.
- Identification of the dietary, behavioral, environmental, social, or genetic factors that increase the risk of overweight in high-risk population groups.
- The health consequences of repeated cycles of weight gain and loss.
- The most effective individual, group, and community intervention strategies for weight management.
- The most effective intervention strategies for use with high-risk groups.
- The most effective means by which to educate individuals and the public about the factors predisposing to weight gain and loss.
- The most effective ways in which to promote increased physical activity in the population.
- The long-term effectiveness of existing weight control programs.

SKELETAL DISEASES

The prevalence, health consequences, and expense of osteoporosis among Americans make it a compelling public health priority. Dietary factors of particular concern are calcium, phosphate, vitamin D (and its hormonally active form calcitriol), protein, sodium, calories, and alcohol.

How these factors affect peak bone mass development is important and requires further investigation. Other lifestyle factors that may decrease the risk for osteoporosis include increased exercise and decreased cigarette smoking. In postmenopausal women, estrogen-replacement therapy has been the best documented method of preventing osteoporosis.

The dietary factors associated with bone mass, the universality of bone loss with age, the interaction of diet and lifestyle with genetic factors, and the difficulties in measuring bone loss in populations make defining the relationship between diet and osteoporosis difficult. However, evidence suggests that, particularly during the first three to four decades of life, ingesting adequate calcium, maintaining appropriate body weight, exercising, restricting alcohol, and avoiding cigarette smoking are appropriate public health strategies for prevention of osteoporosis.

Most interest in the dietary control of osteoporosis focuses on calcium. Although current epidemiologic and clinical evidence is uncertain, chronic low calcium intake may decrease peak bone mass, especially during adolescence. Surveys indicate that dietary calcium intake of adolescent girls is one-third or more below the 1,200 mg/day recommended for this population and that adult women of reproductive age also consume less than the recommended 800 mg/day. Although the ideal level of calcium intake for development of peak bone mass is unknown, and although it has not yet been established whether increased calcium intake will prevent osteoporosis, females, particularly adolescents and young adults, in the United States should increase food sources of calcium. The public should also be educated about the calcium content of various foods, particularly low-fat dairy products, and should maintain adequate calcium intake at all ages.

Additional study of epidemiologic association between diets high in protein and increased prevalence of osteoporosis is required to make further conclusions.

Special Populations

Children, pregnant and lactating women, and older people have special needs of calcium based on, respectively, the extra skeletal demands of growth, milk production, or the age-related decrease in absorption of calcium. Older Americans consume amounts of calcium that average as much as 40 percent below current recommendations of 800 mg/day. Postmenopausal women should receive counseling on supplemental use

of estrogen, and all groups should receive information about calcium-rich foods. People who take calcium supplements also need education on appropriate use, side effects, the forms in which they are best absorbed, and interactions with other medications.

Food Labels

Present evidence on the role of dietary factors in skeletal disease has no special implications for change in policy related to food labeling. However, nutrition labeling, which lists calcium and other nutrient content, should be encouraged on most food products.

Food Services

Aside from the special populations noted below, evidence related to the role of dietary factors in skeletal diseases currently holds no special implications for change in policy related to food service programs.

Food Products

Foods abundant in calcium are widely available in the United States. However, the diversity of U.S. dietary patterns suggests the possibility of calcium fortification of a limited number of foods. These additions should be carefully selected to avoid excessive calcium in the food supply. Fortification should be chosen based on the frequency of consumption of a food by the targeted populations, and the calcium should be in a physiologically available form. It is important to continue fortification of suitable foods with vitamin D because this has been instrumental in reducing the prevalence of rickets and osteomalacia in the United States.

Dietary Counseling

Food services offered to children, adolescents, and young adults should provide diets with sufficient calcium to enhance achievement of peak bone mass. Persons who are unable to convert vitamin D to its active form many require supplementation with calcitriol. Those with chronic malabsorption syndromes may require supplementation with calcium or calcitriol.

Whether calcium, vitamin D, or calcitriol should be provided to older women to prevent or delay postmenopausal bone loss is as yet uncertain. Although evidence for the precise role of physical activity in prevention of osteoporosis is still emerging, it seems reasonable to include exercise

as a component of any program to enhance the skeletal integrity of older Americans. Older persons should be encouraged to maintain regular activities such as walking and other weight-bearing exercise.

Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in skeletal diseases should include investigations into:

- Changes in calcium and phosphate requirements throughout life.
- The effects of altering proportions of phosphate and protein on calcium requirements and bone mineralization.
- The effects of increased calcium intake on peak bone mass and on prevention of postmenopausal bone loss.
- Potential toxicities of high-dose supplements of calcium.
- The development of calcium sources with improved bioavailability.
- Safe and adequate levels of vitamin D added to the food supply.
- The relationship of vitamin D and its metabolites to calcium in the development of peak bone mass and prevention of bone loss.
- The levels of vitamin D and its metabolites, fluoride, and calcium that are safe and adequate for the treatment of osteoporosis.
- The effects of moderate and excessive alcohol intake on bone mineral metabolism.
- The effects of various levels of physical activity on loss of bone mass.
- The relationship of other vitamins and minerals to peak bone mass and to prevention of bone loss.

DENTAL DISEASES

Dietary factors of principal interest in dental disease are sugars and fluoride. Frequent consumption of sugars, especially sucrose, promotes formation of dental plaque, the key predisposing cause of both caries and periodontal disease. In the United States, the daily intake of sugars

ranges on average from 62 to 143 grams, or 18 to 32 percent of total caloric intake. Evidence exists that sugars as they are consumed in the average American diet contribute to the development of dental caries, suggesting that the general public should reduce its sugar consumption.

The role of fluoride in prevention of tooth decay is also well established from animal studies and from human epidemiology and clinical trials. Although fluoride is present in foods, the most efficient source of this nutrient for the general public is community drinking water that naturally contains fluoride at an optimal level or to which fluoride is added to achieve the optimal level. Most, but not all, water supplies can be fluoridated, and current recommendations for optimum fluoride concentrations vary from 0.7 to 1.2 ppm depending on regional variation according to prevailing air temperature. Conclusive evidence shows that such levels of fluoride are safe.

Although other nutrients such as vitamin A, vitamin C, calcium, and phosphate may also be associated with prevention of dental diseases, evidence is insufficient at this time to recommend changes in dietary patterns on the basis of their relationship to these conditions for the general public.

Special Populations

Persons with diminished salivary flow are at special risk for caries and periodontal disease. They also may be unable to wear removable dental prostheses due to the lack of lubrication by saliva. Artificial saliva preparations containing fluoride and topical fluoride gels help to prevent tooth decay in such persons and can be recommended as an adjunct to sugar-restricted diets and appropriate dietary counseling. Children over the age of 6 months are at risk for nursing bottle caries, and their parents and caregivers should receive guidance in dietary and behavioral approaches to prevent this condition. Evidence related to the benefits of fluoride consumption by pregnant women on subsequent tooth development of the fetus is insufficient to recommend fluoride supplementation during pregnancy. Individuals with diabetes are especially prone to periodontal infections and should take special care to use available dietary and therapeutic means to control disease.

Food Labels

The presence and relative amount of added sugars, especially sucrose, contained in processed foods, as indicated by ingredient lists on food

labels, should continue to play an important role in identifying dietary factors associated with dental disease.

Food Services

Evidence related to the role of dietary factors in dental disease suggests that food service programs should provide optimally fluoridated drinking water and promote noncariogenic foods, especially in programs for populations at high risk for dental diseases.

Dietary Counseling

Persons with an active history of dental caries or with reduced salivary flow and parents of young children should be provided with counseling and assistance in developing diets low in cariogenic foods and in accessing appropriate souces of fluoride. Persons with diabetes are especially prone to periodontal infections and should take special care to use available dietary and therapeutic means to control their disease (see section on Diabetes, page 60).

Research and Surveillance

Research and surveillance issues of priority related to the role of diet in dental diseases should include investigations into:

- The definition of critical periods of development of dental tissues that may be sensitive to nutrient intake.
- The role of nutritional factors in the maintenance and repair of the periodontium and oral tissues.
- The relationship between nutritional imbalances during tooth development and the formation of tooth lesions or defects that may increase caries susceptibility in children.
- The role of nutrition and nutritional status in the etiology and pathogenesis of dental diseases in older persons and other high-risk populations.
- The relationship between nutrition and both the immune and the nonspecific defense mechanisms of oral tissues and fluids.
- The most effective means to educate the public on the role of water fluoridation, diet, and dental care in preventing dental diseases.

- The mechanisms of fluoride action in the prevention of dental disease or osteoporosis.
- The effect of dietary factors such as vitamin A, vitamin E, and alcohol on the initiation and progression of oral cancers.
- Epidemiologic methods to determine the correlation between malnutrition and dental caries and/or periodontal disease.
- The role of calcium in the etiology and/or prevention of residual ridge resorption and periodontal disease.
- Estimation of the levels of fluoride from all sources in the diets of children.
- Estimation of the extent of dental fluorosis in the population.

KIDNEY DISEASES

Nutrients of particular interest in the occurrence of renal disease are protein, phosphate, and certain fatty acids. Although there is evidence in animals and humans that protein restriction can retard the progression of end-stage renal disease, there is no evidence that current protein intakes by the American population adversely affect the prevalence of renal disease.

Dietary phosphate restrictions have been noted to retard the progression of renal disease, but there is not sufficient evidence to indicate a role in the prevention of this condition. Nor may any implications be drawn for the general public on the relationship of dietary fatty acids intake to renal disease. Suggestions that certain lipids may increase the progression of renal disease have yielded conflicting research results.

Special Populations

Protein restriction is a therapeutic measure prescribed for patients with advanced renal disease, and end-stage renal disease patients on dialysis must follow a protein-, postassium-, and phosphate-restricted maintenance diet. A qualified health professional should provide information to such patients on using these diets appropriately.

Food Labels and Food Products

Evidence related to the role of dietary factors in renal disease currently holds no special implications for change in policy related to food labeling or food service programs.

Dietary Counseling

Patients with renal disease should receive counseling and assistance in developing diets low in protein and low in phosphate. Those with renal stones should receive advice on diets that reduce excretion of stone-promoting factors (purines and excessive calcium) and should receive recommendations for a high daily fluid intake in excess of two liters.

Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in renal disease should include investigations into:

- The ability of low-protein diets to retard the decline of renal function in normal aging.
- The mechanisms by which dietary protein affects renal function.
- The relationship of the role of dietary protein to that of phosphate in its effect on kidney function.
- The mechanisms by which other nutrients such as fatty acids or amino acids might affect renal function.
- The use of various diets—such as those low in protein or phosphate—to retard the rate of progression of renal failure.
- The relative merits of specialized formula diets, pharmacologic therapy, and traditional low-protein diets in treating progressive renal failure.
- The causes of wasting, malnutrition, and other nutritional disorders that occur in renal failure.
- The treatment—with calories, amino acids, or drugs—of wasting, malnutrition, and other nutritional disorders that occur in renal failure.
- The interplay of dietary factors (such as calcium, vitamin D, phosphate, protein, and oxalate) in the etiology of renal stones.

- The effect of omega-3 fatty acids in preventing the immune inflammatory response in chronic renal disease.
- The regulatory mechanisms in the utilization and metabolism of ketoacids in humans.
- The impact of reduced protein/amino acid intake on the quantitative dynamic status of protein and specific amino acid metabolism in organs and the entire body.
- Lipid metabolism as affected by reduced protein and amino acid intake.
- The role of lipids in the progression of chronic renal disease: lipid turnover by renal cells, effect on tubular growth and function, relationship of hyperlipidemia to renal injury, and effect of drugs in the treatment of hyperlipidemia.
- Control of renal growth and impact of nutrition on renal mass.
- Mechanisms that produce toxicity of uremia and consequences of uremic symptoms.
- Effect of protein restriction, as opposed to total calorie restriction, on renal injury.

GASTROINTESTINAL DISEASES

Dietary fat, fiber, and alcohol are significant factors associated with gastrointestinal diseases, although the great variety of these conditions makes generalizations difficult. Because diets that contain a large proportion of calories from fat may be low in fiber, it is often difficult to separate the effects of these substances on gastrointestinal disease. Thus, current evidence on whether dietary fiber helps prevent diverticulosis is not conclusive. Similarly, whether dietary fiber helps prevent inflammatory or irritable bowel disease is uncertain. Nevertheless, evidence that dietary fiber helps treat and prevent constipation and manage chronic diverticular disease suggests the prudence of consuming diets higher in fiber and lower in fat.

The strong cause-and-effect association between excessive alcohol

consumption and the development of chronic liver disease and cirrhosis (as reviewed in the section on Alcohol, page 91) emphasizes that persons who consume alcoholic beverages should do so in moderation. Epidemiologic associations between diet and some types of gastrointestinal cancer (as reviewed in the section on Cancer, page 57) suggest—but do not yet prove—that consuming less fat and alcohol and more fiber would help reduce the risk for these cancers.

Evidence on the role of dietary factors in the development of gastric or duodenal ulcers or reflux esophagitis is insufficient to make recommendations at this time.

Special Populations

Higher intakes of dietary fiber can prevent or relieve symptoms of constipation and chronic diverticular disease. Qualified health professionals should inform persons with these conditions about foods with relatively high fiber contents. Individuals with celiac disease should be provided with information on foods free of wheat gluten. Those with inflammatory bowel disease, irritable bowel syndrome, lactose intolerance, gallbladder disease, heartburn, and ulcers should be provided with guidance on diets appropriate to their conditions.

Food Labels and Food Products

Evidence related to the role of dietary factors in gastrointestinal disease suggests that food manufacturers should include on package labels information about nutritional content of the food, especially for fat and carbohydrate components (and including fiber components to the extent permitted by analytical methods). Manufacturers are also advised that the public would benefit from additional products that are low in fat and calories and higher in fiber.

Food Services

Evidence related to the role of dietary factors in gastrointestinal diseases suggests that food services should include provisions for adequate intake of high-fiber and low-fat foods.

Dietary Counseling

Persons with gastrointestinal diseases should receive counseling and assistance in developing appropriate diets for their particular condition. Qualified health professionals should provide appropriate training and

enteral or parenteral nutritional support to persons with conditions that prevent food ingestion, cause malabsorption, or impair bowel function.

Research and Surveillance

Research and surveillance issues of special priority related to dietary factors affecting gastrointestinal function and diseases of the gastrointestinal tract should include investigations into:

- The prevalence of gastrointestinal diseases among the population.
- The influence of dietary factors such as specific dietary fibers, fat, and calories on development and function of the digestive tract.
- The influence of dietary factors on the development and release of enzymes and hormones that affect gastrointestinal function.
- The role of intestinal flora on nutrient bioavailability.
- The most effective nutrient-related interventions to improve the recovery of intestinal function following episodes of malnutrition or disease.
- The mechanisms by which dietary fiber may work in the prevention and treatment of bowel cancer, appendicitis, diverticular disease, gallbladder disease, and other gastrointestinal conditions.
- The identification of specific dietary factors that might influence the causation, prevention, and treatment of celiac disease, inflammatory and irritable bowel syndromes, ulcers, and other gastrointestinal disorders.
- The most effective means to achieve dietary counseling to help alleviate gastrointestinal disorders.

INFECTIONS AND IMMUNITY

Adequate nutrient and energy intake is critical to the maintenance of optimal immune function. However, evidence related to the role of specific dietary factors such as fatty acids, vitamin C, or zinc is insufficient to recommend changes in dietary guidance policy for the general public. Evidence related to the role of microbial and chemical contam-

ination of food and water in human health suggests that the general public should receive information on appropriate food handling and storage methods to prevent outbreaks of food-borne disease.

Although the overall public health significance of breastfeeding in the United States is uncertain, studies in developing countries have shown the importance of breastfeeding in preventing diarrheal diseases and in reducing their severity. The immune protection conferred by breastfeeding also helps reduce the severity of certain infectious diseases among infants. Breastfeeding should continue to be recommended to pregnant women and to new mothers as the optimal method of infant feeding.

Although the relationship between malnutrition and changes in immune function observed with aging is not well understood, it is clear that adequate intake of nutrients is basic to the adequate immune protection in older Americans.

Special Populations

Infections produce well-documented adverse effects on nutritional status, and nutritional rehabilitation restores immune function and reduces the severity of infectious disease complications. Thus, the nutritional status of persons with infectious illnesses should be assessed regularly, and appropriate nutritional support measures should be instituted whenever necessary. Qualified health professionals should advise persons with food allergies and intolerances on the diagnosis of these conditions and on diets that exclude foods and food substances that induce symptoms.

Food Labels

Evidence related to diet-immune function interactions reinforces the need for food manufacturers to include explicit and complete ingredient statements to protect individuals who may have severe adverse reactions to foods.

Food Products

Evidence related to diet-immune function interactions suggests that food product manufacturers should take special precautions to use good manufacturing practices to avoid contamination with ingredients that may produce severe reactions and to reduce microbial and chemical contam-

ination during production and storage. Manufacturers should continue to develop new products that are free of substances likely to induce allergic symptoms in susceptible individuals.

Food Services

Current evidence about the role of dietary factors in the maintenance of optimal immune function currently has no special implications for change in policy related to food service programs. Evidence related to the spread of infections suggests that food service personnel should receive adequate training in sanitary food handling and storage procedures.

Dietary Counseling

Patients with infectious diseases should be treated as rapidly and effectively as possible to minimize the depletion of body nutrients. Convalescing patients should be counseled and assisted in the development of diets that provide adequate intake of nutrients to regain an appropriate nutritional status. Patients with food intolerances should be counseled and assisted in the development of diets that omit foods and food factors that induce symptoms.

Research and Surveillance

Research and surveillance issues of special priority related to interactions between diet, infection, and immunity should include investigations into:

- The mechanisms by which generalized malnutrition depresses the function of specific components of the immune system.
- The effects of deficient or excess intake of single nutrients such as vitamin A, zinc, iron, or dietary fat on specific elements of the immune system and on immune function.
- The mechanisms by which deficient or excess intake of single nutrients might depress or improve immune system function.
- The factors in breast milk that protect infants from infectious disease.
- The role of breast milk in transmitting allergens, infectious agents, or toxicants such as drugs.

- The role of nutrition in maintaining adequate immune function in older persons.
- The mechanisms by which infectious diseases alter nutrient metabolism and impair nutritional status.
- The most effective means of restoring nutritional status to malnourished individuals recovering from infectious illnesses.
- The identification of natural food products and chemical additives that induce adverse physiologic responses and the mechanisms by which they do so.
- The basic biochemistry of food antigens and biologically active components.
- The effects of processing and digestion of food substances with conversion to or inactivation of allergenic fractions.
- The value of therapeutic procedures designed to induce tolerance to food antigens.
- The prevalence of food-borne infections and intolerances and immunologic reactions to food in the population.
- The identification of behavioral determinants of unsanitary food handling and storage procedures and the development of effective educational methods to prevent transmission of food-borne illnesses.
- The effect of nutritional status on susceptibility to infectious diseases, including HIV infection, and on the complications of AIDS.

ANEMIA

Prevention of nutrition-related anemia depends on adequate dietary intake of iron, vitamin B_{12}, and folate as well as the full complement of other essential nutrients. Except for younger children and women of reproductive age, who are at greater risk for iron deficiency, it appears that current iron consumption levels are sufficient for most of the population.

Special Populations

Routine health care for infants and pregnant women, the groups at highest risk for anemia, should include laboratory evaluation for anemia and nutritional advice on methods to ensure adequate iron intake. Nonpregnant women in their childbearing years and adolescents are also at greater risk for iron deficiency anemia; these individuals should be monitored and should receive special counsel on preventing iron deficiency. Frequent blood donors, another high-risk group, should be advised by blood bank personnel about dietary methods to enhance iron intake and absorption. Groups who may need iron supplements, such as premature infants, pregnant women, women with excessive menstrual bleeding, frequent blood donors, strict vegetarians, and regular aspirin users, should also receive advice from health professionals on enhancing iron bioavailability from the diet. Specific education efforts directed toward these special groups, even though difficult, are needed.

Folate deficiency anemia usually occurs among women late in the course of pregnancy, among small and premature infants, and among alcoholics. These groups, especially from low-income families, should receive advice about dietary and supplemental sources of this vitamin.

Strict vegetarians who consume no foods of animal origin, especially women who are pregnant or nursing, should be advised to consume supplemental sources of vitamin B_{12}.

Food Programs

Because groups that benefit from food programs are those at highest risk for anemia, such programs should continue to be made available to high-risk groups and should encourage consumption of foods rich in iron and folate. Evidence suggests that current levels of iron fortification are safe and adequate, and no changes should be recommended at this time.

Food Labels

Evidence related to the role of iron and folate in anemia suggests that food labels should indicate the content of these nutrients.

Dietary Counseling

Patients with anemia should receive counseling and assistance to develop diets that have adequate amounts of bioavailable iron, folate, or vitamin B_{12} from dietary or supplemental sources.

Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in anemia should include investigations into:

- Screening for earlier stages of iron deficiency using tests that identify iron depletion (e.g., erythrocyte protoporphyrin).
- Elucidation of the health consequences of conditions of iron depletion prior to development of anemia.
- Validation of methodologies for identification of the extent of deficiencies of iron, folate, and vitamin B_{12} in the general population and in high-risk groups.
- Interactions between iron, folate, vitamin B_{12}, and other nutrients consumed in the diet.
- Improved methods for analysis of the folate content of food.
- Determination of iron requirements at various stages of the life cycle and under various physiologic conditions.
- Identification of appropriate levels and types of iron in the food supply for individuals with hereditary conditions of excess iron absorption.
- Identification of the level of iron intake that confers maximum protection against major infections.
- Determination of trends in iron fortification in the U.S. food supply.
- Development of effective methods to educate the general public and high-risk groups about consuming diets adequate in iron and folate.

NEUROLOGIC DISORDERS

Nutrients of concern in stroke are those associated with its major diet-related risk factors—hypertension, diabetes, and obesity. Evidence suggests that diets low in sodium and alcohol, as well as caloric intake and physical activity to achieve and maintain desirable body weight, should be recommended as public health measures to prevent stroke and its

related conditions. Excessive drinking has been associated with stroke; hence, this practice should be avoided. Although some evidence links very large exposures to major dietary components (e.g., amino acids, choline) to nervous system disorders other than stroke, this evidence is, for the most part, preliminary and remains to be confirmed by additional clinical evidence before implications can be drawn.

Over- or underconsumption of certain vitamins and minerals can damage the nervous system as in the occurrence in alcoholics of thiamin deficiency-related Wernicke-Korsakoff's syndrome.

Special Populations

Studies in patients with major diet-related risk factors for stroke indicate that similar dietary changes can reduce the level of the risk factor and help prevent cardiovascular disease (see sections on High Blood Pressure, Diabetes, and Obesity, pages 55, 60, 62). Qualified health professionals should provide patients with information on the means to achieve these changes. In addition to a focus on weight reduction and sodium restriction, this information should emphasize the importance of alcohol restriction in patients with high blood pressure and/or high glucose levels.

Suggestions that certain foods or food components might influence headache or epilepsy have yielded conflicting research results and are too preliminary to draw conclusions.

Food Labels

Evidence related to the role of dietary factors in stroke and other neurologic diseases supports the need for sodium labeling of packaged food products.

Food Services

Food service programs should emphasize diets low in sodium and calories to maintain ideal body weight and to control obesity and diabetes.

Dietary Counseling

Patients at high risk for stroke and other neurologic conditions should be provided with counseling and assistance in the development of diets appropriate to their conditions.

Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in neurologic disease should include investigations into:

- The role of specific dietary factors in the etiology and prevention of stroke.
- The relationship, if any, between specific dietary factors and specific brain functions such as memory, alertness, and response time.
- The mechanisms by which food components, such as dietary precursors of neurotransmitters and certain additives and toxins, might affect nervous system function.
- The role, if any, of specific dietary factors in the etiology and prevention of Alzheimer's disease.
- The nutritional needs of the brain and nervous system in health and throughout life.
- The effects of excessive intake of nutrients and supplements (vitamins A, B_6, etc.) on nervous system function.
- The mechanism or mechanisms by which excessive alcohol intake increases the risk for stroke.
- The ability of diets low in calories, sodium, alcohol, and, perhaps, other dietary factors to prevent stroke.
- The most effective methods to educate the public about diet-related risk factors for stroke, and to assist the public in making recommended dietary changes.
- The comparative effects of dietary insufficiency on cognitive function and neurologic disease.
- The understanding of the blood-brain barrier nutrient transport processes and the mechanisms by which diet may influence brain function and health.
- The role of preexisting nutritional disease and nutritional status on the impact of neurotoxins.

BEHAVIOR

Behavioral factors clearly influence food selection, dietary change, and chronic disease risk, but research in this area is still too preliminary to draw more than a few implications for the general public; exceptions generally apply to specific chronic disease conditions. Similarly, beyond the dietary guidance implications presented in the section on obesity, current evidence is insufficient to recommend specific dietary changes to prevent or treat the eating disorders—anorexia nervosa, bulimia, and pica. Sugar, certain food additives, and caffeine have been suggested as predisposing dietary factors to the development of behavioral disorders in children and adults, but evidence is weak and contradictory, and there is no reason to expect that a reduced intake of these substances would affect the incidence or severity of behavioral disorders. In addition, current evidence does not support any implications at present about the effects of amino acid precursors of neurotransmitters on behavior.

Special Populations

Studies in patients with eating disorders and other chronic disease conditions (reviewed in other sections of this Report) emphasize the importance of modification of diet-related behavior in these conditions. Such patients should receive advice from qualified health professionals on the application of dietary principles appropriate for their conditions. Although evidence linking dietary caffeine, refined sugars, and food additives to behavioral disorders is uncertain, their elimination from the diet will not impair nutritional status and can be recommended to patients on an individual trial basis.

Food Labels and Food Products

Evidence related to the role of dietary factors in behavioral disorders hold no special implications for food labeling policies or food products at this time.

Food Services

Evidence related to the role of dietary factors in behavioral disorders currently holds no special implications for changes in policies related

to food programs beyond those suggested by the *Dietary Guidelines for Americans*.

Dietary Counseling

Patients with eating disorders should be provided with ready access to counseling and assistance in the development of diets that provide safe and adequate levels of energy and nutrients.

Research and Surveillance

Research and surveillance issues of special priority related to the role of behavior in the prevention of diet-related chronic disease and to the role of diet in behavioral disorders include investigations into:

- Behavioral factors that influence food selection patterns and dietary change.
- The most effective behavioral methods to encourage appropriate dietary changes.
- Behavioral factors that increase the risk for diet-related chronic disease.
- Behavioral factors that increase the risk for obesity, anorexia nervosa, bulimia, and pica.
- The prevalence of these eating disorders among different groups.
- Behavioral techniques effective in treatment of these disorders.
- Effects of foods and nutrients on etiology and treatment of behavioral disorders.
- Behavioral interventions that increase the long-term effectiveness of health promotion and chronic disease treatment programs.

MATERNAL AND CHILD NUTRITION

Assessment of nutritional status is an integral part of maternity care at the beginning of pregnancy and periodically throughout pregnancy and lactation to provide continuing monitoring and recommend appropriate intervention.

Pregnant Women

Evidence related to the role of diet in maternal and child health indicates that well-nourished mothers produce healthier children. Intake of sufficient energy and nutrients to attain optimal nutritional status, including appropriate weight before pregnancy and adequate weight gain during pregnancy, improves infant birth weight and reduces infant mortality and morbidity. Avoiding potentially toxic substances such as alcohol or drugs during pregnancy seems to improve infant birth weight and health, but the evidence regarding low exposures to these agents is not conclusive. Information on appropriate dietary intake, with consideration of ethnic and cultural food habits, should be provided as early as possible to pregnant women and to women expecting to become pregnant.

Some factors present at the onset of pregnancy place women at increased nutitional risk. These include: adolescence, short interconceptional period, poor reproductive performance, economic deprivation, food faddism, substance use, chronic systemic disease, and inadequate or excessive prepregnant weight (below 85 percent or above 120 percent of standard weight for height). Other nutritional risk factors such as anemia and inadequate or excessive weight gain may develop during pregnancy.

Attaining appropriate prepregnancy body weight and nutritional status, gaining adequate body weight, and avoiding alcohol during pregnancy are important for all women. Qualified health professionals should provide close nutritional monitoring and individualized counseling to women appropriate to their educational level and cultural food habits before and throughout pregnancy.

Children

Specialized professional counseling on feeding should be provided to parents of low birth weight (LBW) infants, other infants at high risk, and infants who require special formulas. Parents of children who are at high risk because of developmental disorders, inborn errors of metabolism, physical disabilities, or chronic disease should also receive ongoing professional advice on appropriate diets and feeding methods. Because children from families with a history of diet-related chronic disease have a high risk for such conditions, they should be evaluated for these conditions. Children of families whose blood cholesterol, blood

sugar, or blood pressure exceed appropriate levels should be advised on dietary and other means to reduce these risk factors.

Evidence related to the role of diet in infancy indicates that breast milk is the optimal food for infants. Whenever possible and as early as possible, health professionals should provide guidance and support to pregnant women and new mothers on the importance of breastfeeding and on methods for its initiation and maintenance. Mothers who cannot or choose not to breastfeed should receive information about appropriate formulas.

Consuming the appropriate amount and form of energy and nutrients for developmental age is important for good health, as is early education about lifelong dietary patterns that help prevent disease. Parents should guide their children in developing positive eating behaviors and on age-appropriate food patterns that meet nutritional requirements but avoid excessive intake of fat, sodium, and sugar. Parents should also help adolescents develop healthy eating habits and should emphasize the importance of including sufficient quantities of low-fat, nutritious foods in meals and snacks.

Physicians, nurses, and other health professionals caring for children and women of childbearing age should receive education and training in nutrition assessment, nutrition intervention for prevention of disease, and promotion of maternal and child health.

Nutrition Services

Evidence related to the role of nutrition in maternal, infant, and child health suggest that all health care programs for these groups should provide nutrition services, especially to those people at special health or economic risk. Such services include nutrition assessment, dietary counseling, nutrition education, and referral.

Food Products

Evidence related to the role of dietary factors in maternal and child health suggests that food manufacturers should develop nutritious, low-fat, low-salt, low-sugar snack food products for children and adolescents. Quality and safety of infant formulas and other infant foods require continued monitoring to prevent untoward health consequences.

Dietary Counseling

Pregnant women, infants, and children with diet-related disease conditions and physical disabilities that impair food intake should receive

counseling and assistance in dietary management. Low-income families should have access to an adequate diet. Those with poor education, limited understanding of English, and different cultural patterns require nutrition education approaches appropriate to their needs.

Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in maternal, infant, and child health should include investigations into:

- The amounts of energy and essential nutrients pregnant women must consume to achieve optimal birth outcome and promote long-term maternal health.
- The optimal weight gain during pregnancy.
- The diet during pregnancy that best prevents complications of chronic disease conditions in the mother.
- The effects of potentially toxic dietary factors such as alcohol on fetal health.
- The optimal feeding methods and diet for improving growth and development of LBW infants.
- The diet in childhood that will best prevent later development of chronic disease conditions.
- The influence of nutritional status on teratogenic outcomes, particularly neural tube defects.
- Nutritional care for optimal development of infants and children with special health care needs due to chronic illness or developmental disorders.
- Effective educational methods to teach parents how to develop good dietary practices for themselves and their children.
- Effective educational methods for teaching good nutritional practices to children and adolescents.
- Effective strategies to integrate nutrition screening, education, and intervention services into health care programs.

- The impact of social changes on nutritional status, including those related to meal sources and eating patterns.

AGING

Aging is accompanied by a variety of physiologic, psychologic, economic, and social changes that may compromise nutritional status. However, ways in which the aging process affects energy balance, specific nutrient requirements, and nutrient status remain to be fully elucidated. Older adults may not necessarily have the same nutritional requirements as younger adults, yet current estimates of the nutrient requirements of older persons are based almost entirely on values extrapolated from data from studies of younger adults. The ways in which nutritional status might influence changes in tissue and organ function change with age and may influence the relationships between dietary components and the occurrence of chronic diseases of old age. Until more appropriate age-specific RDA's are established, the current RDA's should continue to be used as standards for nutrient intake of healthy older persons.

Until more is known, older Americans should consume sufficient nutrients and energy and maintain levels of physical activity that maintain desirable body weight and may prevent or delay the onset of chronic disease. Because it is often difficult to maintain adequate nutrient intake on low-calorie diets, older people should be advised to maintain at least moderate levels of physical activity so as to increase caloric needs. Recommendations to the general population about calcium intake (see sections on Skeletal Diseases, page 65) are true for older Americans. Because many of the chronic diseases common to older persons may originate earlier in life (see sections on Maternal and Child Nutrition, page 84), dietary guidance to prevent them should be provided throughout life (as discussed in other sections).

Health promotion messages from the public and private sectors should utilize advanced communication techniques, recognizing different lifestyles, decrements in vision and hearing, different cultural experiences, and different learning styles that may be common to older people. Federal and State agencies should provide information about successful public-private sector models for nutrition, health promotion, and education for older adults—for example, Healthy Older People, Age Well, and OASIS (Older Adult Service Information System).

Special Problems of the Aged

Sedentary older individuals should be counseled on appropriate methods to increase caloric expenditure. Older persons who do not (or cannot) consume adequate levels of nutrients from food sources and those with dietary, biochemical, or clinical evidence of adequate intake should receive advice on the proper type and dosage of nutrient supplements. Such supplements may be appropriate for some older persons, but self-prescribed supplementation, especially in large doses, may be harmful and should be discouraged. Older people who suffer from diet-related chronic diseases should receive dietary counseling from credentialed health professionals, and those who take medications should be given professional advice on diets that minimize food-drug interactions.

Food Labels and Food Products

Evidence related to the role of diet in the aged currently holds no special implications for change in policy related to food labeling, although the size of the type on the label is a factor for most older consumers. Information provided on food labels should be scientifically sound, understandable, and nonmisleading. Older people would benefit from food products that provide a high proportion of available nutrients to calories, that have taste appeal, and that are easy to prepare.

Food Services

Food services, especially those receiving government funds, should be required to pay special attention to meeting the caloric and nutrient needs of older clients. Nutritional assessment and guidance should be done at hospital admission or enrollment in or discharge from institutional or community-based services for older adults (e.g., acute and long-term care inpatient services, hospital-based outpatient services, alcohol and drug treatment programs, community health services, and home-delivered meal programs).

Dietary Support Programs

Older people who are homebound, who live in isolation, or who suffer from chronic disease have special needs for nutrition services that are tailored to their particular conditions. Considerable evidence supports the nutritional and health benefits of dietary, economic, and social support programs for the older population.

Research and Surveillance

Research on nutrition and aging currently focuses on two general areas—the nutritional requirements and status of aging people and the influence of diet on aging processes and related pathologies. Psychosocial interactions with nutrition cut across both areas.

Research and surveillance issues of special priority related to the role of nutrition in the aged should include investigations into:

- The nutrient and energy requirements of older adults, currently extrapolated from younger age groups.
- The effects of dietary restriction and overconsumption on longevity and age-related pathology.
- The interactions among nutritional status, lifestyle and behavior, and the environment in older Americans.
- The effects of nutrition on age-related impairment of the cardiovascular, gastrointestinal/oral, immune, musculoskeletal, and nervous system functions and on prevention and treatment of disorders of those systems.
- The effects of marginal nutrient and energy deficiencies on the mental and physical health of older persons.
- Interactions among nutrients and between nutrients and drugs in older adults.
- Development of data bases for use by pharmacists and dietitians in counseling older persons on drug-nutrient interactions.
- Age-specific methods and standards to assess the nutritional status and body composition of older adults.
- The educational methods and program strategies that best promote adequate food consumption by older persons.
- Improved methods to monitor the nutritional status of older populations and individuals, including institutionalized older adults, over time.
- The educational and public health strategies that can be used to eliminate nutrition-related health fraud directed toward older citizens.

ALCOHOL

Alcohol has been identified as a dietary factor that increases the risk for diseases of the liver, nervous system, and heart. It also contributes to the development of certain cancers. Although consumption of up to one to two drinks per day has not been associated with disease among healthy male and nonpregnant female adults, evidence that 9 percent of the total population consumes two or more alcoholic drinks per day suggests that the risk for alcohol-related conditions could be reduced by an overall decrease in alcohol consumption among some segments of the general public.

Special Populations

Because studies in pregnant women have been unable to identify a threshold level of safety for alcohol intake during pregnancy, and because the risk for fetal abnormalities increases with increased alcohol intake during pregnancy, pregnant women—and women planning to become pregnant—should be advised to avoid drinking alcohol.

Persons with alcohol-related liver, nervous system, and cardiovascular conditions (e.g., elevated blood cholesterol and blood pressure levels) should receive advice from health professionals to reduce or eliminate alcohol intake to reverse or to prevent progression of these conditions. Persons with diabetes should also receive counseling on the effects of alcohol on caloric intake and blood glucose control.

Adolescents and young adults should be counseled in schools and through the media on the relationship between alcohol intake and motor vehicle and other accidents, suicides, and homicides. Older individuals should be counseled on the relationship between alcohol intake, nutritional deficiencies, and drug interactions.

Food Labels

Evidence related to the role of alcohol in health suggests that if alcoholic beverage containers are required to bear health warning labels, these labels should carry information warning of hazards to the developing fetus as well as of other health hazards associated with alcohol consumption abuse.

Food Services

Aside from the special populations noted below, evidence related to the role of alcohol currently holds no special implications for change in policies related to food service programs.

Alcohol Counseling

Pregnant women, including those served by the Special Supplemental Food Program for Women, Infants, and Children (WIC) and other maternal and child health programs, should be provided with counseling on avoidance of alcoholic beverages. Persons with alcohol-related conditions should be provided with counseling and referrals on the benefits of abstinence.

Research and Surveillance

Research and surveillance issues of special priority related to the role of alcohol and health include investigations into:

- The levels at which alcohol intake increases risk for chronic diseases and birth defects.
- The mechanisms by which alcohol induces fatty changes in the liver.
- The mechanisms by which alcohol increases blood pressure, blood cholesterol, blood glucose levels, and other risk factors for chronic disease.
- The mechanisms by which low levels of alcohol may reduce risk for coronary heart disease.
- The mechanisms by which alcohol increases cancer risk.
- The mechanisms by which alcohol damages the nervous system.
- The mechanisms by which alcohol intake interferes with nutritional status.
- Definition of the physiologic energy value of alcoholic beverages.
- The interaction of alcohol intake, nutritional status, socioeconomic status, and health.

DRUG-NUTRIENT INTERACTIONS

Although drugs interact with dietary factors in many ways that impair nutrient availability, evidence about the public health significance of such interactions is insufficient to recommended general shifts in the pattern of use of any particular drug on the basis of its adverse effects on nutritional status. Nor may any implications be drawn at this time for the general public on intake of specific nutrients with relation to nonprescription drug interactions.

Special Populations

Studies of patients consuming multiple drugs for prolonged time periods, especially those patients who are older, suggest that dietary intakes may need to be adjusted to compensate for adverse interactions of specific nutrients with medications and that information should be provided to such patients by qualified health professionals on appropriate use of such diets. Patients taking drugs that induce acute reactions in the presence of dietary factors such as tyramines or alcohol should be instructed on appropriate means to avoid those factors.

Persons with inborn metabolic errors that respond to pharmacologic doses of nutrients or to special products designed to minimize toxic symptoms should be advised on the safe and effective use of such therapies. Health professionals should receive instruction about drug-nutrient interactions to understand how best to maximize drug efficacy and minimize adverse reactions.

Food Labels and Food Services

Evidence related to the role of diet in drug interactions currently holds no special implications for change in policy related to food labeling and food service programs.

Drug Labels

Evidence related to the role of diet in drug interactions suggests that drug manufacturers should provide information in the package insert on the potential effects of the medication on nutritional status, and vice versa.

Food Products

Evidence related to the role of diet in drug interactions currently holds no special implications for change in policy related to packaged food products. Preliminary evidence relating human infections to antibiotic-resistant micro-organisms derived from animals treated with subtherapeutic doses of antibiotics suggests the need for close scrutiny of this practice.

Drug and Nutrient Counseling

Persons—especially older persons—who consume drugs should be provided with counseling and assistance on dietary methods to avoid adverse drug-nutrient interactions. Persons with inborn metabolic errors requiring therapy with pharmacologic doses of nutrients should be provided with counseling and assistance on appropriate and safe use of such supplements.

Research and Surveillance

Research and surveillance issues of special priority related to the role of diet in drug interactions should include investigations into:

- The extent of drug taking (prescription, over the counter, and illegal) among the population.
- The extent of adverse drug-nutrient interactions in the population.
- Age-related changes in nutrient metabolism with special implications for pharmaceutical use.
- Effects of medications on the nutritional status of older persons.
- Drug effects on nutrient intake, absorption, metabolism, and excretion.
- Effects of diet, including alcohol, on drug absorption, metabolism, and excretion.
- The effects on antibiotics, hormones, or other drugs in animal feeds on human health.
- The levels of intake of essential nutrients that induce toxic symptoms.
- The most effective means to educate health professionals and the general public about drug-nutrient interactions.

DIETARY FADS AND FRAUDS

Running counter to—and sometimes capitalizing on—legitimate gains in scientific understanding of the relationships between diet and health, food faddism and nutrition fraud are increasingly prevalent in the United States. Although most of the adverse consequences of this trend are economic, fraud can cause significant health consequences to individuals as a result of direct toxicity and as a result of failure to seek appropriate medical care or to engage in genuinely healthful dietary practices. Cooperative educational efforts by government, health professionals, and the private sector, including the news media, are needed to expose emerging fads and frauds before they are widely accepted. One approach to this end is general public education to reinforce the basic principles of sound nutrition as stated in the *Dietary Guidelines for Americans*. Another approach is to direct the public to responsible sources of nutrition information.

Special Populations

Special efforts should be directed toward older persons, who are the target of much nutrition fraud. Cooperative educational efforts by government and the private sector, such as current collaborations of the FDA with the Pharmaceutical Advertising Council and the Council of Better Business Bureaus, can provide effective support for government enforcement programs. People with chronic debilitating illnesses—such as cancer, coronary heart disease, arthritis, or Alzheimer's disease—may be especially susceptible to fads and frauds, and health providers should be informed about the most common schemes in each area and should be involved in the effort to forewarn patients.

Food Labels

Food labels should contain information about nutrient content that is provided in a straightforward, effective, and efficient way. Should a health-claims-approved program be implemented, claims for a particular product should be presented in a manner that is most informative, scientifically sound, and not misleading to consumers.

Food Services

Education provided in the context of food services should emphasize general principles of sound nutrition for the general public and inform

people about the nature of and problems associated with common nutritional frauds and fads.

Food Products

The FDA is charged with ensuring that misleading claims about foods are not presented to the public and that specific foods are not promoted as therapeutic or preventive agents unless there is adequate documentation to support such claims. Continued support for, and vigilance by, the FDA is important in this regard. A cornerstone of this effort is close coordination of regulation and enforcement activities of the various agencies at the federal, state, and local levels through coalitions developed against nutrition fraud.

Research and Surveillance

Research and surveillance issues of special priority related to the issue of food fads and frauds should include investigations into:

- Frequency and type of fraudulent claims and harmful effects.
- Establishment of safe levels of essential nutrients as well as other components in food.
- The personal and behavioral factors that enhance response to certain unscientific claims and ways to counter them.
- The level of use of vitamin, mineral, and food components that may induce nutrient toxicities or deficiencies in the general public.

III

SEVEN-DAY MEAL PLANS

ABOUT THE LOW-FAT MEAL PLAN

(also effective in increasing fiber and carbohydrates and lowering sodium)

Almost everyone agrees that we should eat less fat; exactly how much less is a matter of opinion. The typical American diet derives almost 40 percent of its calories from fat; by contrast, traditional Japanese diets include only about 10 percent. Our solution is a middle ground, so we've designed these meal plans to provide about 25 percent of calories from fat. (Note: A 2,000-calorie-per-day diet permits about 56 g of fat at the 25 percent level. An 1,800-calorie-per-day diet permits about 50 g of fat at the 25 percent level). We've also limited the cholesterol content of these menu plans.

When you reduce the fat in your diet, you inevitably replace it with foods high in carbohydrates and fiber. These low-fat meal plans, therefore, meet two objectives: lower fat; and higher carbohydrates and fiber. In addition, you can specifically maximize the fiber content in these menus by choosing high-fiber cereals and breads whenever these two food choices are required.

As with other menu plans, these contain fewer than 2,000 calories per day. For those who need more calories than these plans provide, use them as a starting point, but increase your intake of other foods, as needed, to get enough calories. One word of caution though—make sure that the foods you add are not high in fat or sodium and still contain ample fiber.

These plans are designed with healthy people in mind. Although they provide useful guidance for those on therapeutic diets, please realize that we were not able to tailor them to the special needs of those who may require stricter diets.

LOW-FAT DAILY NUTRITIONAL AVERAGES

Calories: 1,760	***Sodium:*** 2,697 mg
Fat: 37 g	***Calcium:*** 1,011 mg
Cholesterol: 172 mg	***Iron:*** 22 mg

LOW-FAT DAY 1

Breakfast

1 cup low-fat yogurt drink
1 cup orange juice
1 cup iron-fortified oatmeal
¼ cup raisins
Tea/coffee with skim milk

Lunch

1 tomato stuffed with chicken salad
1 oat-bran muffin
4 carrot sticks
¼ cup shredded lettuce
3 unsalted rice cakes
1 watermelon slice

Snack

1 peach, plum, or nectarine
2 rye crackers with 2 slices low-fat cheese

Dinner

1 cup tossed salad with 2 tablespoons low-fat reduced-calorie dressing
½ cup meatless chili
1 ear corn with 1 teaspoon high-polyunsaturated margarine
1 baked apple with 1 tablespoon raisins and 1 tablespoon walnuts
1 cup coffee with skim milk

Calories: *1,733*
Fat: *41 g (21 percent of calories)*
Cholesterol: *125 mg*
Sodium: *2,910 mg*
Calcium: *1,035 mg*
Iron: *23 mg*

Recipe tie-in: *For a cold dessert on a hot summer day, replace the baked apple with Red and Green Grapes with Walnuts and Yogurt Cream (see recipe p. 161).*

LOW-FAT DAY 2

Breakfast

½ cup strawberries or blueberries
1 ounce shredded wheat
½ cup skim milk
1 cup unsweetened pineapple juice
Tea or coffee

Lunch

1 cup tomato-based fish chowder
½ cup tuna salad
1 slice whole wheat bread
2 slices tomato
Carrot and celery sticks
1 plum or peach

Snack

1 cup low-fat fruit yogurt
1 slice watermelon

Dinner

1 slice French bread
1 cup black bean soup
1 baked potato with 2 teaspoons margarine and ¼ cup plain, low-fat yogurt
4 ounces swordfish steak
½ cup cantaloupe chunks
1 cup iced tea

Calories: *1,786*
Fat: *30 g (15 percent of calories)*
Cholesterol: *177 mg (will vary with ingredients in chowder)*
Sodium: *3,243*
Calcium: *820 mg*
Iron: *14 mg*
Recipe tie-in: *Exchange the French bread and black bean soup for a serving of Black Bean Salad with Tomato and Basil (see recipe p. 145).*

LOW-FAT DAY 3

Breakfast

Cantaloupe wedge with ½ cup low-fat cottage cheese and 2 tablespoons All-Bran cereal
1 ounce Total cereal with ½ cup skim milk
Coffee or tea

Lunch

Salmon melt: ½ cup salmon salad on 1 English muffin with 2 slices low-fat cheese
Iced tea with lemon
Sliced fresh peach with dusting of cinnamon

Snack

½ cup sherbet
4 graham crackers

Dinner

Lettuce wedge with 2 teaspoons olive oil and ⅔ teaspoon vinegar
4 ounces grilled chicken
1 cup black-eyed peas with 1 teaspoon high-polyunsaturated margarine
½ baked sweet potato
1 corn muffin
1 cup raspberries

Calories: *1,753*
Fat: *43 g (22 percent of calories)*
Cholesterol: *162 mg*
Sodium: *3,255 mg*
Calcium: *1,042*
Iron: *30 mg*
Recipe tie-in: *Store-bought sherberts are no match for our Mango Sorbet!* *(see recipe p. 162).*

LOW-FAT DAY 4

Breakfast

1 cup pineapple juice
1 ounce Just Right cereal with 1 small banana, sliced
1 cup skim milk for cereal and coffee
Coffee

Lunch

1 cup tomato-based fish chowder
2 slices French bread
1 cup fresh fruit cocktail, juice-packed
Iced tea

Snack

4 fig bars
Coffee w/skim milk

Dinner

Raw carrot sticks, green pepper, mushrooms, celery with low-fat-yogurt cheese (see recipe p. 42) for dipping
4 ounces baked cornish hen, without skin
½ cup pasta
½ cup ratatouille
½ cup fresh cherries topped with ½ cup vanilla ice milk
Coffee with skim milk

Calories: *1,716*
Fat: *25 g (13 percent of calories)*
Cholesterol: *197 mg (will vary with ingredients in chowder)*
Sodium: *2,536 mg*
Calcium: *978 mg*
Iron: *27 mg*

Recipe tie-in: *Use Grilled Cornish Hens with Lemon and Garlic for the dinner entrée (see recipe p. 153), and our Roasted Eggplant with Garlic and Thyme (see recipe p. 157), instead of the ratatouille. Very elegant.*

LOW-FAT DAY 5

Breakfast

1 slice cantaloupe
1 oat-bran muffin
1 tablespoon apple butter
1 cup skim milk

Lunch

¾ cup orange juice
½ cup bean soup
1 roast-beef pita: 1 pocket bread, ¼ cup tomato, ¼ cup cucumber, 1 tablespoon low-calorie dressing, 2 ounces very lean roast beef, 2 slices low-fat cheese

Snack

1 cup lemon low-fat yogurt

Dinner

3 ounces grilled oysters, brushed with olive oil, and garnished with lemon wedges
1 dinner roll with 1 teaspoon margarine
½ cup cauliflower
½ cup wild rice with ½ cup cooked onion sautéed in 2 teaspoons olive oil
3 ounces turkey breast
½ cup blueberries

Calories: *1,765*
Fat: *46 g (23 percent of the calories)*
Sodium: *2,801 mg*
Calcium: *1,252 mg*
Iron: *21 mg*

Cholesterol: *245 mg*
Recipe tie-in: *Try Cauliflower, Tandoor Style (see recipe p. 156) for a change from the usual turkey accompaniments. Or replace both the cauliflower, rice, and seasonings with a serving of Vegetable Paella with Feta Cheese (see recipe p. 159).*

LOW-FAT DAY 6

Breakfast

1 cup oat-bran cereal
½ cup sautéed apples with cinnamon
½ cup skim milk
1 cup hot apple cider

Lunch

Chef Salad: 1 cup lettuce, ¼ cup onion, ¼ cup cucumber, ¼ cup tomato, ¼ cup chick peas, 1 ounce low-fat cheese, 2 tablespoons diet dressing
1 whole wheat pita with ⅓ cup hummus for dipping
¾ cup low-sodium vegetable-juice cocktail

Snack

1 orange
1 ounce Crunchy Bran (corn-bran) cereal

Dinner

½ cup carrots
½ cup asparagus
2 new potatoes with ½ cup plain low-fat yogurt

6 ounces broiled flounder
1 kiwi fruit
1 oat-bran muffin with 2 teaspoons no-sugar preserves

Calories: *1,710*
Fat: *32 g (17 percent of calories)*
Cholesterol: *155 mg*
Sodium: *1,987 mg*
Calcium: *952 mg*
Iron: *21 mg*
Recipe tie-in: *Herb-Pressed Grilled Halibut (see recipe p. 149) makes a fine substitute for the flounder. Enjoy the Oat and Apple Muffin (see recipe p. 138) along with it.*

LOW-FAT DAY 7

Breakfast

1 ounce fortified bran cereal with ½ cup skim milk
½ cup fruit cocktail
Coffee with skim milk

Lunch

Cold plate: 1 bagel with 2 slices tomato, 1 tablespoon diet mayonnaise, 4 slices cucumber and 2 ounces salmon, 1 sliced apple, ½ cup low-fat cottage cheese with ¼ cup raisins
½ cup bean salad made with ½ tablespoon olive oil
Tea with milk

Snack

1 cup skim milk
1 slice fruitcake

Dinner

½ cup marinated mushrooms
4 ounces oven-fried chicken (without the skin)
1 baked potato with 1 teaspoon high-polyunsaturated margarine
½ cup green peas with 1 teaspoon high-polyunsaturated margarine
1 cup lemonade

Calories: *1,859*
Fat: *41 grams (20 percent of calories)*
Cholesterol: *142 mg*
Sodium: *2,150 mg*
Calcium: *1,000 mg*
Iron: *16 mg*

Recipe tie-in: *Make the dinner appetizer with our recipe for Marinated Mushrooms, Chinese Style (see recipe p. 140).*

ABOUT THE LOW-SODIUM MEAL PLAN

We all need some sodium in our diets, but this need is fortunately one that takes care of itself. Small amounts of sodium occur naturally in food and are almost always enough to meet our needs. The problem is, of course, that our modern-day diets contain so much more than we need.

There is no recommended dietary allowance for sodium as there is for the well-known vitamins and minerals. Rather, the Food and Nutrition Board has set a so-called "safe and adequate intake" level that ranges from 1100–3300 mg a day. We've designed these menus at the lower end of this range. Nonetheless, some people may need to restrict sodium even more, and if you are advised to do so, please realize that these menu plans may not be suitable for you. You can, however, reduce their sodium content further by using only unsalted breads and unsalted packaged foods (become a label reader).

If your calorie needs exceed those of these plans, add more foods, selecting from those that are also reasonably low in sodium. See the chart on pages 34–37 for guidance.

LOW-SODIUM DAILY NUTRITIONAL AVERAGES

Calories: 1,773	***Sodium:*** 1,152 mg
Fat: 53 g	***Calcium:*** 1,052 mg
Cholesterol: 290 mg	***Iron:*** 34 mg

LOW-SODIUM DAY 1

Breakfast

1 cup unsweetened pineapple juice
¾ cup puffed wheat, with 1 banana, sliced, and ½ cup skim milk

1 ounce part-skim mozzarella cheese
Tea/coffee

Lunch

1 cup black bean soup, made without salt
Open sandwich: 1 slice part-skim mozzarella cheese, 4 ounces lean roast beef, 1 slice whole wheat bread
½ cup berries
1 cup orange juice

Snack

¼ cup peanuts, unsalted
1 cup popcorn, unsalted
1 cup hot cocoa from skim milk

Dinner

1 cup tossed salad with 1 tablespoon reduced-calorie olive oil–vinegar dressing
2 egg omelette with chopped onions, tomato, and 2 tablespoons grated Swiss cheese
½ cup oven-baked potatoes
1 cup hot fruit compote with ½ cup ice milk
¾ cup low-sodium vegetable juice cocktail

Calories: *1,742*
Fat: *64 g*
Cholesterol: *698 mg*
Sodium: *1,004 mg*
Calcium: *1,258 mg*
Iron: *14 mg*

Recipe tie-in: *Use the Plum Gratiné recipe (see recipe p. 163) for the hot fruit compote at dinner.*

LOW-SODIUM DAY 2

Breakfast

½ grapefruit
1 cup oatmeal with 2 tablespoons raisins
½ cup skim milk

Lunch

Salad plate: ½ cup celery, ½ cup cucumber, ½ cup parsley, ½ cup unsalted, low-fat cottage cheese, 2 ounces lean roast beef
1 orange, sectioned

Snack

¼ cup sunflower seeds, unsalted
⅓ cup dried apples
Iced tea
1 cup cranberry juice cocktail

Dinner

3 breadsticks
1 grated carrot with 1 teaspoon dilled reduced-calorie mayonnaise
½ cup broccoli
½ cup squash
2 teaspoons unsalted margarine or butter
1 cup black-eyed peas, unsalted
3 ounces chicken breast
2 tablespoons barbecue sauce
½ cup strawberries

Snack

1 cup low-fat coffee yogurt

Calories: *1,767*
Fat: *44 g*
Cholesterol: *139 mg*
Sodium: *927 mg*
Calcium: *969 mg*
Iron: *16 mg*
Recipe tie-in: *Substitute Curried Carrot Puree (see recipe p. 155) for the carrot and dill dressing appetizer.*

LOW-SODIUM DAY 3

Breakfast

1 banana
2 slices oatmeal bread
2 tablespoons apple butter
½ cup skim milk
1 ounce natural Swiss cheese

Lunch

1 tomato stuffed with curried tuna: ½ cup unsalted, water-pack tuna, 1 tablespoon mayonnaise, 2 tablespoons chopped onion, curry powder to taste
1 sliced apple
1 cup lemonade

Snack

1 pear

Dinner

1 cup shredded lettuce and tomato salad with 1 tablespoon Russian dressing
½ cup broccoli
¾ cup brown rice with 1 teaspoon unsalted margarine or butter
3 ounces broiled cod and 4 ounces broiled oysters with lemon, parsley, and 2 teaspoons olive oil
1 baked apple
1 cup orange juice

Snack

6 ounces low-fat yogurt

Calories: *1,819*
Fat: *43 g*
Cholesterol: *249 mg*
Sodium: *1,334 mg*
Calcium: *1,131 mg*
Iron: *25 mg*

Recipe tie-in: *Have the oysters as the entrée at dinner, but substitute Cod Stew with Pesto (see recipe p. 143) for the serving of broiled cod. Reduce the olive oil used on the oysters to one teaspoon.*

LOW-SODIUM DAY 4

Breakfast

⅔ cup Total cereal with ¼ cup blueberries and 1 banana, sliced
½ cup skim milk

Lunch

½ cup unsweetened pineapple chunks
¾ cup brown rice with unsalted, stir-fried chicken and vegetables and 3 tablespoons unsalted sunflower seeds
1 cup hot apple cider

Snack

2 ounces lean roast beef with 7 Triscuit crackers (*note*: other crackers may be higher in sodium)
1 cup orange juice

Dinner

1 cup tossed salad with 1 tablespoon low-calorie Italian dressing
1 egg omelette with ¼ cup onions, ¼ cup green peppers, ¼ cup mushrooms, 2 ounces part-skim mozzarella cheese
½ cup unsalted lima beans
1 slice honeydew melon

Calories: *1,763*
Fat: *49 g*
Cholesterol: *421 mg*
Sodium: *1,255*
Calcium: *793 mg*
Iron: *27 mg*

Recipe tie-in: *Replace the stir-fried chicken and vegetables with Vermicelli with Thyme-Scented Chicken (see recipe p. 151). Be aware that each tablespoon of grated Romano cheese will add about 60 mg of sodium—and some brands may have higher levels.*

LOW-SODIUM DAY 5

Breakfast

Easy Fruit Crunch: 1 fresh sliced peach, 1 sliced banana, ⅓ cup crushed Wheat Chex cereal
1 slice low-sodium cracked-wheat bread with 3 tablespoons unsalted cottage cheese and cinnamon, broiled
Tea

Lunch

1 small tomato, cut into wedges with ¼ avocado, sliced
½ can water-packed, low-sodium tuna with 1 tablespoon diet mayonnaise
2 ounces zweiback crackers
5 unsalted pretzels

Snack

2 cups unsalted popcorn
1 cup hot cocoa using skim milk

Dinner

4 ounces fresh fish filet, broiled without salt
Baked stuffed potato with ¼ cup natural Swiss cheese
Tossed salad with 2 tablespoons unsalted reduced-calorie dressing
½ cup frozen yogurt

Calories: *1,779*
Fat: *52 g*
Cholesterol: *146 mg*
Sodium: *1,012 mg*
Calcium: *849 mg*
Iron: *63 mg*

Recipe tie-in: *At dinner, let Salmon Filet with Frizzled Collards (see recipe p. 149) serve as both the entrée and the salad.*

LOW-SODIUM DAY 6

Breakfast

1 sliced orange
1 cup oatmeal with cinnamon and dried apples
Coffee or tea
¼ cup skim milk

Lunch

1 cup reduced-sodium (or unsalted) vegetable soup
1 grilled cheese sandwich made with 2 slices low-sodium whole wheat bread, 1½ ounces natural Swiss cheese, and 2 slices tomato
1 apple
1 cup skim milk

Snack

1 banana milkshake made with 1 small banana, ¾ cup skim milk, 1 tablespoon unsalted peanut butter, 1 tablespoon honey, 3 ice cubes

Dinner

1 cup tossed salad with 2 tablespoons salt-free reduced-calorie dressing
6 ounces lean veal cubes stir-fried with green pepper, mushrooms, onions
½ cup juice-packed canned peaches
1 cup iced tea

Calories: *1,746*
Fat: *74 g*
Cholesterol: *171 mg*
Sodium: *1,339 mg*
Calcium: *1,255 mg*
Iron: *64 mg*

Recipe tie-in: *For a variation on the snack, try our Super Health Shake* *(see recipe p. 137).*

LOW-SODIUM DAY 7

Breakfast

4 ounces orange juice
1 ounce Corn Total cereal with ½ cup skim milk

Lunch

Cold plate: 3 ounces lean roast beef slices, 1 ounce natural Swiss cheese, ½ green pepper (sliced), 4 carrot sicks, 2 unsalted matzohs, ½ cup potato salad made without salt
1 small piece fruitcake
1 cup skim milk

Snack

1 ounce unsalted peanuts
Iced tea

Dinner

1 ounce breadsticks
Chicken Cacciatore: 4 ounces cooked chicken breast, ½ cup cooked pasta, made without salt, ½ cup unsalted tomato sauce
½ cup lima beans
Coffee or tea with skim milk

Calories: *1,785*
Fat: *42 g*
Cholesterol: *205 mg*
Sodium: *1,193*
Calcium: *1,111 mg*
Iron: *27 mg*

Recipe tie-in: *Omit the chicken from the dinner, leaving the pasta and tomato sauce as a side dish. Serve Chicken Cutlets with Yogurt Marinade (see recipe p. 152) as the main part of the meal.*

ABOUT THE CALCIUM-RICH MEAL PLAN

Here's a week's worth of calcium-rich meal plans, each providing at least 1,000 mg of calcium. You'll find specific calcium and calorie counts at the end of each day's food list.

Of course, some people—particularly men—need more calories than these meal plans provide. Such people can select additional foods to add to these plans in order to meet their calorie needs.

In 1984 a panel of experts convened by the National Institute of Health advised postmenopausal women who are not taking estrogen replacement therapy to seek calcium intakes above the current RDA. Often an intake of 1,500 mg daily is recommended. Many women find as a practical matter that getting amounts this high from diet alone is difficult. Naturally, supplementation may be needed in these cases. Should you be determined to get a full 1,500 mg of calcium from food alone, add at least one serving a day from the foods that appear in the "Best" column of the calcium chart on page 41.

As for adolescents, and pregnant and lactating adult women, the recommended allowance is 1,200 mg of calcium. Most of these meal plans provide this amount, though a few contain just a little less. Adding just one serving of any of the foods contained in the "Best" column in the calcium chart will bring total calcium intake to the desired level.

Calcium-Rich Daily Nutritional Averages

Calories: 1,731	***Sodium:*** 2,309 mg
Fat: 45 g	***Calcium:*** 1,411 mg
Cholesterol: 227 mg	***Iron:*** 23 mg

CALCIUM-RICH DAY 1

Breakfast

1 cup orange juice
1 egg scrambled with 1 slice of low-fat cheese (torn into small pieces)
1 slice whole wheat toast with 1 tablespoon apple butter
1 cup skim milk
Coffee

Lunch

Salad Bar: 2 tablespoons alfalfa sprouts, ¼ tomato, ⅓ cup broccoli, 2 tablespoons grated cheese, ¼ cup carrots, 2 tablespoons chick peas, 2 tablespoons sliced mushrooms, 1 teaspoon minced onions, 1 tablespoon low-fat Italian dressing
½ cup (4 ounces) pink salmon with 1 tablespoon reduced-calorie mayonnaise
3 whole-grain crackers
1 cup melon

Snack

1 apple with ½ cup low-fat vanilla yogurt
2 ounces Crunchy Bran (corn-bran) cereal

Dinner

Salad: ½ sliced cucumber, ½ green pepper (sliced), 2 tablespoons chopped parsley, ¼ cup yogurt dressing
4 ounces steamed flounder
½ cup steamed broccoli
½ cup oven-browned potatoes with 2 teaspoons unsalted margarine
1 pear

Calories: *1,736*
Fat: *45 g*
Cholesterol: *416 mg*
Sodium: *2,695 mg*
Calcium: *1,539 mg*
Iron: *23 mg*
Recipe tie-in: *Instead of the flounder and broccoli at dinner, substitute Salmon Filet with Frizzled Collards (see recipe p. 149).*

CALCIUM-RICH DAY 2

Breakfast

½ cup applesauce (unsweetened) with 1 tablespoon raisins
1 English muffin with 1 ounce melted Swiss cheese
1 cup hot cocoa from skim milk

Lunch

1 glass of low-fat milk
1 cup tabouleh
1 bran muffin (homemade from iron-fortified bran cereal)
1 apple

Snack

½ cup vanilla low-fat yogurt
2 tablespoons almonds
Iced tea

Dinner

1 cup black-eyed peas with 1 teaspoon margarine or butter
1 cup broccoli

¾ cup spaghetti with ½ cup tomato sauce and ¼ cup grated Parmesan cheese
½ cup strawberries or blackberries with ½ cup vanilla yogurt

Calories: *1,816*
Fat: *46 g*
Cholesterol: *87 mg*
Sodium: *2,096 mg*
Calcium: *1,969 mg*
Iron: *16 mg*
Recipe tie-in: *Replace the tabouleh at lunch with Rice and Sweet Pepper Salad with Spicy Cajun Mayonnaise (see recipe p. 147).*

CALCIUM-RICH DAY 3

Breakfast

1 cup cantaloupe with ½ cup low-fat ricotta cheese
⅔ cup Total cereal with ½ cup skim milk
Tea or coffee with milk

Lunch

1 cup bok choy
3 ounces boiled, spiced shrimp
1 cup pasta twists with 1 tablespoon diet margarine and 2 tablespoons grated parmesan
5 ''water biscuit'' crackers
1 slice watermelon

Snack

2 rice cakes
1 peach

Dinner

4 ounces broiled flank steak
1 baked sweet potato with 1 teaspoon margarine or butter
1 cup collard greens with 1 teaspoon margarine or butter
1 baked apple with ½ cup low-fat vanilla yogurt

Calories: *1,726*
Fat: *55 g*
Cholesterol: *301 mg*
Sodium: *1,622 mg*
Calcium: *1,406 mg*
Iron: *25 mg*
Recipe tie-in: *Use the Flank Steak with Bay and Red Wine recipe (see p. 154) for the main course at dinner.*

CALCIUM-RICH DAY 4

Breakfast

1 banana milkshake
4 graham crackers (or 2 large)
Coffee or tea with milk

Lunch

½ can (1¾ ounces) sardines in water (drained)
1 tablespoon reduced-calorie mayonnaise
½ sliced tomato
½ cup romaine lettuce
carrot and celery sticks
1 corn muffin with 2 tablespoons apple butter
1 cup watermelon chunks

Snack

2 ounces Crunchy Bran (corn-bran) cereal
½ cup skim milk

Dinner

1 hamburger patty (3 ounces lean ground chuck)
1 ounce low-fat cheese
1 ear corn with 1 teaspoon butter
½ cup cooked broccoli
1 slice angel food cake
½ cup slice peaches, sprinkled with cinnamon and 2 teaspoons toasted coconut

Calories: *1,716*
Fat: *53 g*
Cholesterol: *195 mg*
Sodium: *2,115 mg*
Calcium: *1,072 mg*
Iron: *25 mg*
Recipe tie-in: *Use Super Health Shake recipe (see p. 137) to make the banana milkshake.*

CALCIUM-RICH DAY 5

Brunch

½ cup grapefruit
4 honey-apple pancakes with 6 tablespoons yogurt topping
1 cup reduced-calorie hot cocoa

Snack

Sardine pâté with 4 whole grain crackers
½ cup dried peaches
1 cup unsalted tomato juice

Dinner

Green salad: ½ cup fresh collard greens, 2 slices tomato, 1 teaspoon chopped onion, 2 tablespoons grated cheddar cheese, 1 tablespoon low-calorie dressing
4 ounces salmon steak
½ cup rice with ¼ cup tomato sauce
½ cup blackberries with 1 cup frozen yogurt
Coffee or tea with milk

Calories: *1,709*
Fat: *39 g*
Cholesterol: *255 mg*
Sodium: *1,623 mg*
Calcium: *1,460 mg*
Iron: *13 mg*
Recipe tie-in: *Our Sardine Pâté is featured as the afternoon snack (see recipe p. 141).*

CALCIUM-RICH DAY 6

Breakfast

½ cup tomato juice
½ cup toasted bagel with 1 ounce melted Swiss cheese
Tea or coffee with milk

Lunch

Chicken salad: 2 ounces chopped chicken breast, 1 tablespoon reduced-fat mayonnaise, lettuce
1 whole wheat pita pocket
½ cantaloupe with ½ cup creamed cottage cheese, no salt added
1 cup unsweetened pineapple juice

Snack

1 cup lemon low-fat yogurt with 1 ounce iron-fortified cereal for topping
1 banana

Dinner

Small chef's salad: ⅓ cup romaine lettuce, ⅓ cup tomato, ½ ounce turkey, ½ ounce ham, 1 tablespoon low-calorie Italian dressing
¾ cup macaroni and cheese
½ cup fresh fruit salad: ¼ cup apple and ¼ cup orange

Calories: *1,714*
Fat: *43 g*
Cholesterol: *149 mg*
Sodium: *3,139 mg*
Calcium: *1,166 mg*
Iron: *25 mg*

Recipe tie-in: *Enjoy our Frozen Cantaloupe-Blueberry Yogurt (see recipe p. 160) as the lunchtime treat, instead of the cantaloupe with cottage cheese.*

CALCIUM-RICH DAY 7

Breakfast

1 banana
1 ounce Just Right or other iron-fortified cereal
½ cup skim milk

Lunch

½ cup lentil or split-pea soup
1 baked potato, stuffed with 3 tablespoons cheddar cheese

Sandwich: 1 slice whole grain toast with 2 tablespoons sliced mushrooms, 2 tablespoons sprouts, and 1 ounce melted part-skim mozzarella
½ cup low-fat yogurt
½ cup cantaloupe

Snack

Sardine pâté spread on 2 slices French bread
5 dates

Dinner

1 cup unsalted cream of celery soup made with skim milk
1 cup tossed salad with 2 tablespoons reduced-calorie Thousand Island dressing
4 ounces steamed scallops
½ cup applesauce

Calories: *1,703*
Fat: *37 g*
Cholesterol: *188 mg*
Sodium: *2,876 mg*
Calcium: *1,324 mg*
Iron: *31 mg*

Recipe tie-in: *Use a slice of our Easy Whole Wheat Bread (see recipe p. 139) for the sandwich at lunch, then use again for the bread at snacktime.*

ABOUT THE IRON-RICH MEAL PLAN

This seven-day menu plan is designed to provide at least 18 mg of iron per day—that's 100 percent of the RDA for women of childbearing age. These meal plans also make use of the iron-enhancing effects of vitamin C and small amounts of meat, poultry, and fish.

Recommended iron intakes for adult men and women who have passed menopause are much lower—only about 10 mg per day. These menu plans easily meet that—and even with minor substitutions, they are unlikely to fall below 10 mg per day. Again, some people will need to add more food to bring their calorie intake up to their needs.

Pregnant women may need a lot more iron than food can realistically provide. So these meal plans will not meet their needs, and a doctor-prescribed supplement is generally essential.

IRON-RICH DAILY NUTRITIONAL AVERAGES

Calories: 1,785	***Sodium:*** 2,571 mg
Fat: 48 g	***Calcium:*** 961 mg
Cholesterol: 256 mg	***Iron:*** 25 mg

IRON-RICH DAY 1

Breakfast

½ cup cantaloupe with ½ cup cherries
½ English muffin
1 ounce low-fat cheese slice
1 ounce very lean ham
1 teaspoon mustard
¾ cup hot apple cider

Lunch

Chef's salad bowl: ½ cup raw spinach, ½ cup sprouts, ½ tomato, 6 slices cucumber, ⅓ cup kidney beans, 2 ounces cooked chicken, 1 ounce cheddar cheese, 2 tablespoons low-calorie Italian dressing
1 fresh apricot
1 cup postum with skim milk

Snack

Snack mix: ½ cup vanilla yogurt, ¼ cup pumpkin seeds, 2 tablespoons raisins, 3 tablespoons granola (iron-fortified brand), ¼ cup dried apricots
½ cup skim milk

Dinner

¾ cup chicken broth with ¼ cup vermicelli noodles
1 or 2 tacos, filled with 2 ounces extra-lean ground beef and 4 tablespoons shredded lettuce, ⅓ cup chopped tomato, ¼ cup chopped green pepper, 1 teaspoon chopped onion
1 peach or nectarine
1 cup homemade orange soda (¼ cup thawed orange juice concentrate plus ¾ cup club soda)

Calories: *1,786*
Fat: *49 g*
Cholesterol: *156 mg*
Sodium: *2,333 mg*
Calcium: *968 mg*
Iron: *18 mg*

Recipe tie-in: *Substitute Crisp Wontons Stuffed with Salmon (see recipe p. 142) for the noodle soup. Just a single serving contains enough fish to enhance the absorption of iron from vegetables eaten at the same time.*

IRON-RICH DAY 2

Breakfast

¾ cup low-sodium vegetable-juice cocktail
1 poached or soft-boiled egg
2 slices whole wheat toast with 2 tablespoons no-sugar preserves
1 cup hot cocoa made from skim milk

Lunch

½ cup tomato juice
Salad Niçoise; 3 steamed new potatoes (cold), ½ cup cooked green beans, 2 tablespoons sliced onion, ½ cup shredded romaine lettuce, ½ can (6½ ounces) water-pack tuna, 1 tablespoon olive oil, 1 teaspoon vinegar, pinch garlic powder
1 pear with ¼ cup chopped almonds
4 ''Ry-Krisp'' natural crackers

Snack

1 cup postum with skim milk
⅓ cup dried peaches
½ cup vanilla low-fat yogurt

Dinner

1 cup green salad: shredded spinach and romaine, 2 tablespoons reduced-calorie dressing of your choice
4 ounces steamed shrimp
½ cup rice-and-green-pea salad with 1 teaspoon reduced-calorie dressing of your choice
¾ cup pineapple (fresh)
Sparkling water

Calories: *1,716*
Fat: *45 g*
Cholesterol: *536 mg*
Sodium: *2,424 mg*
Calcium: *872 mg*
Iron: *18 mg*

Recipe tie-in: *Serve Mixed Greens with Fennel Vinaigrette (see recipe p. 146) as the dinner salad and/or Shrimp in Chili Sauce (see recipe p. 150) as the entrée. Both feature a tangy flavor that will bring a touch of spice to the meal.*

IRON-RICH DAY 3

Breakfast

1 cup cantaloupe chunks
⅔ cup Product 19 cereal
1 cup skim milk
¾ cup orange juice

Lunch

Mini cheese and vegetable plate: 2 ounces part-skim mozzarella cheese, plus carrot and celery sticks
1 cup chili (made with beans and very lean ground beef)
½ cup cole slaw
¾ cup pineapple juice

Snack

2 cups popcorn
1 cup weak coffee with skim milk (optional)

Dinner

½ sliced tomato and ½ cucumber with 2 tablespoons reduced-calorie dressing
½ cup green peas
1 sweet potato with 1 teaspoon butter or margarine
1 cup crabmeat, steamed with 1 tablespoon diet margarine
1 English muffin
½ cup pudding made with skim or low-fat milk

Calories: *1,793*
Fat: *50 g*
Cholesterol: *289 mg*
Sodium: *3,163 mg*
Calcium: *1,231 mg*
Iron: *28 mg*
Recipe tie-in: *Instead of the tomato-cucumber salad, try Roasted-Tomato Soup (see recipe p. 144).*

IRON-RICH DAY 4

Breakfast

⅓ cup Bran Buds cereal
5 dried apricot halves
½ cup skim milk

Lunch

½ cup white- or kidney-bean salad
Open-faced sandwich: 1 slice whole wheat bread, 2 ounces turkey breast, 2 slices low-fat cheese, ½ cup lettuce, 1 tablespoon mustard
1 peach

Snack

1 baked apple with ¼ cup raisins

Dinner

1 cup whole wheat spaghetti with 3 ounces lean ground veal and ½ cup tomato sauce
1 cup mixed vegetables
½ cup custard

Snack

½ cup toasted soybean nuts
¾ cup orange juice

Calories: *1,900*
Fat: *47 g*
Cholesterol: *283 mg*
Sodium: *2,660 mg*
Calcium: *1,079 mg*
Iron: *23 mg*

Recipe tie-in: *Prepare the spaghetti and sauce from the Whole Wheat Spaghetti with Sweet Pepper Purée (see recipe p. 148). The pepper sauce makes a unique yet nutritious substitute for the tomato sauce.*

IRON-RICH DAY 5

Breakfast

¾ cup orange juice
1 ounce Total cereal
½ cup skim milk
½ cup sliced peaches

Lunch

1 cup spinach salad with ½ cup orange sections, 2 tablespoons chopped black walnuts, and 2 tablespoons low-calorie dressing
3 ounces cold chicken slices
1 slice rye bread
1 tablespoon reduced-fat mayonnaise
¾ cup pineapple juice

Snack

3 oatmeal-raisin cookies
1 cup skim milk

Dinner

1 cup onion soup with 1 slice French bread and 1 slice part-skim mozzarella cheese (melted)
1 cup tossed salad with 2 tablespoons reduced-calorie dressing
4 ounces flank steak
Sparkling water
1 cup mango

Calories: *1,741*
Fat: *56 g*
Cholesterol: *193 mg*
Sodium: *3,230 mg*
Calcium: *930 mg*
Iron: *30 mg*

Recipe tie-in: *Serve Flank Steak with Bay Leaves and Red Wine (see recipe p. 154) as the dinner entrée.*

IRON-RICH DAY 6

Breakfast

¾ cup orange-grapefruit juice
1 cup farina or cream of wheat
½ cup unsweetened applesauce with raisins

Lunch

Mini-pizza: 1 English muffin with 2 teaspoons unsalted margarine, tomato sauce, 2 ounces lean ground beef, and ¼ cup part-skim mozzarella cheese
1 cup orange sections

Snack

1 ounce Crunchy Bran (corn-bran) cereal
1 banana

Dinner

1 cup chili, made with very lean ground meat
2 slices hot Italian bread
1 cup tossed salad with 2 tablespoons low-calorie dressing
1 cup apple juice

Calories: *1,710*
Fat: *47 g*
Cholesterol: *140 mg*
Sodium: *2,898 mg*
Calcium: *498 mg*
Iron: *26 mg*

Recipe tie-in: *Substitute a serving of Polenta with Mushrooms and Tomatoes (see recipe p. 158) for the English muffin and tomato sauce at lunch. Enjoy the ground beef and 2 tablespoons of cheese on a slice of crispbread.*

IRON-RICH DAY 7

Breakfast

⅔ cup Product 19 cereal
½ cup skim milk
½ grapefruit, broiled with cinnamon and 1 tablespoon brown sugar
1 cup postum with skim milk (optional)

Lunch

2 ounces ground turkey meatballs in 1 pita pocket with 2 slices tomato and shredded lettuce
Fresh fruit cup with ½ cup lemon or vanilla low-fat yogurt
1 cup pineapple juice

Snack

½ cup soynuts
1 cup hot cocoa made from skim milk

Dinner

1 cup tossed green salad with ⅓ cup white beans
4 ounces curried lamb with ⅓ apple, sliced
½ cup wild rice with 1 tablespoon diet margarine
½ cup cooked carrots
Coffee with skim milk

Calories: *1,850*
Fat: *45 g*
Cholesterol: *177 mg*
Sodium: *1,297 mg*
Calcium: *1,152 mg*
Iron: *32 mg*

Recipe tie-in: *For the fresh fruit cup and yogurt topping at lunch try Red and Green Grapes with Walnut and Yogurt Cream (see recipe p. 161).*

IV

RECIPES

ABOUT THE RECIPES

Now for the best part—the food! Each of these recipes meets all of the guidelines of *The Surgeon General's Report*, and they all are mouth-watering. No one has to convince us that food can be healthful, beautiful, and delicious at the same time. We're sold on the idea. We only want to convince you, too. But we won't stop there. We also insist that our recipes be simple and easy to prepare. So we try to keep the ingredient list short, and whenever possible, we use items that you'll find in most supermarkets.

To us, the key to healthful cooking is learning new techniques—such as oven-frying instead of deep-fat frying. We've designed these recipes to illustrate the techniques that work. Use them to adapt your own favorites to be more healthful. You can also use these recipes in conjunction with our meal plans. For each day's menu plan we suggest one or more of these recipes that fits in well. Please note that the nutritional analyses following each recipe applies to one serving.

- Breakfast and baked goods
- Appetizers
- Soups and salads
- Main dishes
- Side dishes
- Desserts

We hope you'll try at least one of each type—better yet, enjoy them all.

BREAKFAST RECIPES

HONEY AND APPLE PANCAKES

8–10 pancakes, serves 4–5

A great high-fiber breakfast or brunch that also makes a memorable dessert.

1¼ cups whole wheat pastry flour
¼ cup instant nonfat dry milk
3 tablespoons toasted wheat germ
1¼ teaspoons baking powder
¼ teaspoon cinnamon
1 egg beaten
1⅓ cup low-fat buttermilk or nonfat (liquid) milk
1 tablespoon canola or vegetable oil
1 tablespoon dark honey
1 tart apple, grated and drained
2 cups low-fat vanilla yogurt

---

1. In a medium bowl stir together the flour, dry milk, wheat germ, baking powder and cinnamon.

2. In another medium bowl whisk together the egg, milk, oil, and honey. Add to the dry ingredients and stir just until blended. Don't overmix. Fold in the apples.

3. Spray a large nonstick skillet with nonstick spray and heat on medium-high. For each pancake pour ¼ cup of batter into the skillet and cook until the edges have browned and the top is bubbly—about 3 minutes. Flip and cook until done—about 2 minutes more.

4. Serve warm accompanied with the yogurt for topping.

Calories: 375	*Fat:* 8 g	*Cholesterol:* 78 mg
Sodium: 335 mg	*Calcium:* 436 mg	*Iron:* 2.2 mg

SUPER HEALTH SHAKE

serves 2

2 bananas
1 cup cold skim milk
½ cup strawberries or 1 peach, pitted and sliced

Combine all of the ingredients in a blender and whip until smooth. Serve for breakfast or a snack.

Calories: 159 *Fat:* less than 1 g *Cholesterol:* 2 mg
Sodium: 65 mg *Calcium:* 163 mg *Iron:* 0.5 mg

OAT AND APPLE MUFFINS

makes 1 dozen

1 cup oat bran
1½ cups whole wheat pastry flour
2 teaspoons baking powder
½ cup raisins
1 cup buttermilk
1 egg, beaten
⅓ cup molasses
3 tablespoons canola or vegetable oil
1 teaspoon vanilla
1 apple, peeled and grated

---

1. Preheat the oven to 400° F.

2. In a large bowl combine the oat bran, flour, and baking powder. Toss in the raisins and stir to combine.

3. In another bowl whisk together the buttermilk, egg, molasses, oil, and vanilla. Use a large rubber spatula to scoop the wet ingredients into the dry, adding in the apple as you go. For the best texture, don't overmix.

4. Line a muffin tin with paper liners and fill with batter. Bake until cooked through, about 18–20 minutes. Let cool on a wire rack for about 7 minutes before enjoying.

Calories: 170	*Fat:* 5 g	*Cholesterol:* 24 mg
Sodium: 101 mg	*Calcium:* 92 mg	*Iron:* 1.5 mg

EASY WHOLE WHEAT BREAD

makes 1 loaf, about 10 slices

1 package yeast
1 tablespoon brown sugar
1 tablespoon canola oil or mild olive oil
1½ cups water, heated to 110° F
3 cups whole wheat bread flour
½ teaspoon salt
1 cup Just Right or other iron-fortified cereal

1. In a large bowl combine the yeast, sugar, oil, and ½ cup of the water. Stir briefly—until the yeast has dissolved. Add the rest of the water, the flour, salt, and cereal, and mix well. If the dough is a bit sticky, add more flour; if the dough seems dry, add more water.

2. Knead the bread for 10 minutes, then set in an oiled bowl, and roll the dough over to expose the entire surface to the oil. Cover with plastic wrap and let rise in a warm place until doubled in size—about 40 minutes. Punch it down with your fist, and let it rise again for the same amount of time.

3. Using a rolling pin, roll out the dough to an 8-inch square. Next, roll this up and set in an 8½ × 4½ × 2½-inch oiled loaf pan, seam side down. Let the dough rise for a third time until the top has risen above the edge of the pan. Meanwhile, preheat the oven to 350° F.

4. Bake the bread until the bottom sounds hollow when firmly tapped, about 55 minutes. Let cool. This bread will keep for about 4 days.

Calories: 154	*Fat:* 2 g	*Cholesterol:* 0 mg
Sodium: 140 mg	*Calcium:* 18 mg	*Iron:* 4 mg

MARINATED MUSHROOMS, CHINESE STYLE

serves 4

1 pound fresh mushrooms (e.g. button, shiitake, or some of each)
Boiling water for blanching
½ cup rice vinegar (or a mild white vinegar)
1 teaspoon reduced-sodium soy sauce
1 teaspoon hot pepper sauce, or to taste
1 teaspoon toasted sesame oil
3 slices ginger
3 cloves garlic, peeled and chopped

---

1. If using shiitake mushrooms, trim and discard the stems.

2. Blanch the mushrooms in the boiling water for 2 minutes, then drain and pat dry. Transfer them to a large jar or container.

3. In a medium bowl whisk together the vinegar, soy sauce, hot pepper sauce, and sesame oil. Pour into the jar of mushrooms, then add the ginger and garlic. Cover the jar and shake well.

4. Let marinate in the refrigerator overnight. Serve plain or on red-leaf lettuce as an appetizer, salad, or side dish.

Calories: 48	*Fat:* 2 g	*Cholesterol:* 0 mg
Sodium: 93 mg	*Calcium:* 10 mg	*Iron:* 1.5 mg

SARDINE PÂTÉ

serves 3

1 can (3.75 ounces) sardines, drained
½ cup part-skim ricotta
3 scallions, very finely minced, about ¼ cup
1 teaspoon prepared, Dijon-style mustard

---

1. Combine all of the ingredients in a medium bowl and mash together with a fork. Mash just enough to break up the sardines and incorporate the ingredients; don't purée.

2. Serve warm or slightly chilled as a spread for whole wheat pita or cucumber rounds, or warm with hot pasta.

Calories: 126	*Fat:* 7 g	*Cholesterol:* 56 mg
Sodium: 257 mg	*Calcium:* 238 mg	*Iron:* 1.4 mg

CRISP WONTONS STUFFED WITH SALMON

makes 12 wontons, serves 4

"Oven-fried" foods require far less fat than their deep-fried cousins, yet retain the same distinctive taste. These wontons—baked instead of deep-fried—prove the point. Enjoy them as a snack or appetizer.

½ cup (4 ounces) canned salmon
1 teaspoon reduced-sodium soy sauce
1 clove garlic, mashed
12 wonton skins (available in produce section of supermarkets)
1–2 tablespoons peanut oil

---

1. Preheat the oven to 450° F.

2. Combine the salmon, soy sauce, and garlic in a small bowl and mash with a fork. Next, set the wonton skins out on a dry counter and place a heaping teaspoonful of filling on a corner of each skin.

3. To assemble, wet a finger with water and run it around the edge of each skin. Next, fold each skin over on itself to make a triangle, pressing the edges together firmly.

4. Arrange a wire cake-cooling rack on top of a cookie sheet and set the wontons on the rack. Use a pastry brush to paint each one with oil, making sure the entire surface is lightly coated. You probably won't need all the oil.

5. Bake in the middle of the oven until the wontons are crisp and gently browned. Serve warm.

Calories: 130	*Fat:* 6 g	*Cholesterol:* 8 mg
Sodium: 148 mg	*Calcium:* 55 mg	*Iron:* 0.5 mg

COD STEW WITH PESTO

serves 4

This pesto uses very little oil, yet gives the stew a robust, full flavor. A delight for dieters and gastronomes alike.

1 large sweet, yellow onion, sliced and separated into rings
2 cups chopped ripe tomatoes (or one 14-ounce can)
1½ cups chicken stock
½ cup dry white wine
1 large bay leaf
½ cup minced fresh parsley
1 pound cod filet, cut into 2-inch squares
¼ cup fresh basil leaves
2 tablespoons freshly grated Parmesan
2 teaspoons olive oil

---

1. Spray a medium saucepan with nonstick spray and place on medium heat. Toss in the onion and sauté until just beginning to brown, about 5 minutes.

2. Add the tomatoes, stock, wine, bay leaf, parsley, and cod, and simmer gently until the cod has cooked through, about 15 minutes.

3. Meanwhile, make the pesto. Combine the basil, Parmesan, and oil in a spice grinder or mortar and pestle. Grind until you have a smooth paste.

Serve the stew hot, in shallow bowls, with 1 tablespoonful of the pesto swirled into each bowl. Crusty whole-grain bread makes a perfect accompaniment.

Calories: 176	*Fat:* 5 g	*Cholesterol:* 51 mg
Sodium: 151 mg	*Calcium:* 115 mg	*Iron:* 2.5 mg

ROASTED-TOMATO SOUP

serves 4

The roasting technique adds flavor without fat.

8 ripe medium tomatoes (about 2 pounds)
2 tablespoons very finely minced fresh parsley
2 tablespoons very finely minced fresh chives
2 cloves garlic, mashed

---

1. Preheat the broiler.

2. Use a paring knife to core the tomatoes, then squeeze them upside-down over the sink to get rid of the juice.

3. Arrange the tomatoes on a cookie sheet that has sides. Broil about 5½ inches from the heat source until the skins are charred—about 3 minutes on each side.

4. Set the tomatoes in a large bowl and cover with a tea towel until cool. Slip off the skins and toss the tomatoes into a processor or blender along with the parsley, chives, and garlic. Mix until smooth. Reheat gently in a medium saucepan and serve warm.

Calories: 40	*Fat:* less than 1 g	*Cholesterol:* 0 mg
Sodium: 17 mg	*Calcium:* 18 mg	*Iron:* 1.1 mg

BLACK BEAN SALAD WITH TOMATO AND BASIL

serves 4

2 cups cooked black beans (rinse if canned)
2 ripe tomatoes, chopped
4 large green pimento-stuffed olives, chopped
2 teaspoons olive oil
2 teaspoons balsamic vinegar, or other fragrant vinegar
⅓ cup minced fresh basil, or 2 teaspoons dried
2 cloves garlic, mashed

Combine all of the ingredients in a medium bowl and toss well. Serve at room temperature, or very slightly chilled, in split whole wheat pitas, or as a salad on a bed of tender spinach leaves.

Calories: 154	*Fat:* 3 g	*Cholesterol:* 0 mg
Sodium: 100 mg	*Calcium:* 48 mg	*Iron:* 2.5 mg

MIXED GREENS WITH FENNEL VINAIGRETTE

serves 4

4 cups tender greens, like spinach, arugula, watercress, curly-leaf lettuce
3 scallions, julienned
1 teaspoon fennel seed
2 teaspoons olive oil
1 tablespoon cider vinegar
½ teaspoon Dijon-style, prepared mustard

---

1. Toss the greens and scallions into a large salad bowl and keep nearby.

2. Place a dry nonstick sauté pan on medium-high heat. Toss in the fennel seeds; stir and heat until fragrant and golden, about 2 minutes.

3. Meanwhile, whisk together the oil, vinegar, and mustard until smooth. Add the seeds to this mixture, then pour it over the greens. Toss the salad. Serve as a first course or side dish with poached or grilled fish.

Calories: 38	*Fat:* 3 g	*Cholesterol:* 0 mg
Sodium: 64 mg	*Calcium:* 68 mg	*Iron:* 1.8 mg

RICE AND SWEET PEPPER SALAD WITH SPICY CAJUN MAYONNAISE

serves 4

A wonderful main-dish salad that not only has many nutritional virtues but also looks and tastes great.

2 cups cooked, medium-grain, brown rice
1 sweet red pepper, cored, seeded, and julienned
1 sweet yellow pepper, cored, seeded, and julienned
1 tablespoon reduced-calorie mayonnaise
1 tablespoon nonfat yogurt
Juice and pulp of ½ lime (about 2 tablespoons)
1 teaspoon hot pepper sauce, or to taste
1 teaspoon thyme
½ teaspoon oregano
½ teaspoon basil
1 clove garlic, mashed
Curly lettuce

---

1. Combine the rice and sweet peppers in a medium serving bowl.

2. Fold together well mayonnaise, yogurt, lime, hot pepper sauce, thyme, oregano, basil, and garlic in a small dish.

3. Combine the mayonnaise and rice mixtures and toss well. Spoon onto curly lettuce leaves and serve at room temperature or very slightly chilled.

Calories: 143	*Fat:* 2 g	*Cholesterol:* 1 mg
Sodium: 65 mg	*Calcium:* 39 mg	*Iron:* 1.6 mg

WHOLE WHEAT SPAGHETTI WITH SWEET PEPPER PURÉE

serves 4

1 tablespoon olive oil
1 leek, white part only, washed thoroughly, and chopped
4 sweet red peppers, cored, seeded, and chopped
2 cloves garlic, mashed
⅓ cup chicken or vegetable stock
2 cups cooked whole wheat spaghetti or vermicelli
Freshly grated Parmesan

---

1. Warm the oil over medium heat in a large nonstick sauté pan. Add leeks, peppers, and garlic, and sauté until the vegetables are fragrant and tender, about 5 minutes. Take care that the garlic doesn't burn.

2. Scoop the pepper mixture into a blender or processor and mix until smooth and puréed. If the purée is too thick, add a bit of stock and mix to combine. Toss with the pasta and serve hot, sprinkled with Parmesan.

Variation: Use yellow or green peppers instead of red.

Calories: 136	*Fat:* 4 g	*Cholesterol:* 0 mg
Sodium: 9 mg	*Calcium:* 18 mg	*Iron:* 2.3 mg

HERB-PRESSED GRILLED HALIBUT

serves 4

1 pound halibut
2 teaspoons olive oil
1 tablespoon minced fresh basil or 1 teaspoon dried
1 tablespoon minced fresh oregano (no stems) *or* 1 teaspoon dried
Lemon wedges

---

1. Prepare the grill or preheat the broiler.

2. Rub the halibut with oil, then rub in the basil and oregano. Grill or broil about 5½ inches from the heat source until cooked through—about 4½ minutes on each side. Serve hot with lemon wedges.

Calories: 147	*Fat:* 5 g	*Cholesterol:* 36 mg
Sodium: 61 mg	*Calcium:* 67 mg	*Iron:* 1.3 mg

SALMON FILET WITH FRIZZLED COLLARDS

serves 4

1 pound salmon filet
2 teaspoons coarse, country-style, prepared mustard
2 teaspoons olive oil
2 cups shredded collard greens
1 shallot, minced
Freshly grated Parmesan for sprinkling

1. Paint the flesh side of the salmon with the mustard. Next, set a large, nonstick sauté pan over medium-high heat. Put the salmon in skin side down, and cook for about 4 minutes. Use a large spatula to turn the filet over and continue to sauté until cooked through—again about 4 minutes. (Check the end of the filet to see if it's cooked through.) Remove the salmon from the pan and keep it warm.

2. Pour oil into the pan, let it warm, then add the collards and shallot. Sauté over high heat until the collards are soft and frizzled—about 3 minutes. Arrange around and over the salmon, sprinkle with Parmesan, and serve warm.

Calories: 203	*Fat:* 10 g	*Cholesterol:* 62 mg
Sodium: 101 mg	*Calcium:* 123 mg	*Iron:* 1.5 mg

SHRIMP IN CHILI SAUCE

serves 4

Tender shrimp in a robust sauce made without butter or oil.

2 fresh jalapeño peppers
½ cup tomato sauce
1 teaspoon cider vinegar
1 pound large or jumbo shrimp, peeled, deveined, and steamed
Rice or pasta

1. Preheat the broiler.

2. Set the jalapeños on a cookie sheet and broil on all sides until charred. Place them in a bowl covered with a tea towel, and let them cool for about 20 minutes.

3. Wearing gloves, remove and discard the charred skin from the jalapeños. Then purée them in a processor or blender along with the tomato sauce and vinegar.

4. Warm the sauce slightly in a small saucepan (or in a small bowl in the microwave). Stir in the shrimp and serve warm over rice or pasta.

Note: the sauce can be made up to a week ahead and refrigerated until needed.

Calories: 110	*Fat:* 2 g	*Cholesterol:* 140 mg
Sodium: 321 mg	*Calcium:* 53 mg	*Iron:* 2.5 mg

VERMICELLI WITH THYME-SCENTED CHICKEN

serves 4

Delicate pasta with a fragrant, low-fat sauce.

½ pound boneless, skinless chicken breast
1 tablespoon olive oil
1 teaspoon thyme
1 clove garlic, mashed
1 onion, sliced
1 small zucchini, julienned
¼ pound mushrooms, sliced
2 cups cooked vermicelli
Freshly grated Romano cheese

1. Cut the chicken into 1-inch cubes. Warm oil in a nonstick sauté pan over medium heat. Add the chicken, thyme, and garlic, and sauté for about 2 minutes.

2. Next, add the onion, zucchini, and mushrooms. Continue to sauté until the vegetables are tender and the chicken is cooked through—about 6–7 minutes.

3. Toss the chicken mixture with the hot vermicelli and serve in shallow bowls. Top with a sprinkling of Romano.

Calories: 190 *Fat:* 5 g *Cholesterol:* 33 mg
Sodium: 40 mg *Calcium:* 31 mg *Iron:* 2 mg

CHICKEN CUTLETS WITH YOGURT MARINADE

serves 4

⅔ cup plain nonfat yogurt
1 teaspoon prepared, Dijon-style mustard
1 teaspoon prepared, coarse mustard
1 teaspoon tarragon
1 pound chicken cutlets (boneless, skinless chicken breasts)

1. Combine the yogurt, mustards, and tarragon in a large shallow bowl.

2. Trim away and discard any visible fat from the chicken. Then set each cutlet between two sheets of waxed paper and pound until about ⅓-inch thick.

3. Place the cutlets in the marinade, turning them over to make sure all surfaces are coated. Let marinate for about an hour.

4. When ready to cook, preheat a large nonstick pan on medium heat. Lift each cutlet out of the marinade and set in the pan. Sizzle until cooked through—about 5 minutes on each side. Serve warm as an entrée or slightly chilled for a chicken sandwich.

Calories: 150 *Fat:* 2 g *Cholesterol:* 67 mg
Sodium: 153 mg *Calcium:* 93 mg *Iron:* 1 mg

GRILLED CORNISH HENS WITH LEMON AND GARLIC

serves 4

The lemon combines with the herbs to create a marinade that doesn't need a single grain of added salt.

2 cornish hens
2 cloves garlic, mashed
1 teaspoon oregano
½ teaspoon thyme
1 bay leaf
Juice and pulp of 2 lemons

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1. Use poultry shears to split the hens in two down the backbone. Trim away the excess fat from around the neck. Set the hens in a shallow bowl.

2. To make the marinade, combine the garlic, oregano, thyme, bay leaf, and lemon in a small bowl. Pour over the hens and let them marinate for at least an hour. If you prefer, refrigerate and allow to marinate overnight. Turn hens at least once.

3. When ready to cook, prepare the grill or preheat the broiler. Grill or broil the hens about 5½ inches from the heat source, until cooked through—about 9–10 minutes on each side.

Serve warm or very slighly chilled. For a dish that is not only low in salt but also in fat and calories, remove the skin before eating.

Calories: 308*	*Fat:* 17* g	*Cholesterol:* 110 mg
Sodium: 103 mg	*Calcium:* 37 mg	*Iron:* 2.1 mg

*includes skin

FLANK STEAK WITH BAY LEAVES AND RED WINE

serves 4

1 pound flank steak, about 1-inch thick
½ cup dry red wine
2 teaspoons Worcestershire sauce
3 bay leaves
1 teaspoon whole black peppercorns
3 cloves garlic, mashed

---

1. Trim the steak of any visible fat and set it in a glass baking pan. Pour on the wine and Worcestershire sauce, crush the bay leaves and toss in along with the peppercorns and garlic. Cover, and let marinate overnight or at least 4 hours in the refrigerator, turning the steak midway.

2. When you're ready, preheat the broiler or prepare the grill. Drain the marinade and broil the steak about 5½ inches from the heat source, until cooked through the way you like it. About 7 minutes on each side will give you medium-rare.

3. Let the steak relax for a few minutes, then slice thinly against the grain. Serve warm, or very slightly chilled with an interesting mustard and dark bread.

Calories: 213	*Fat:* 12 g	*Cholesterol:* 58 mg
Sodium: 99 mg	*Calcium:* 20 mg	*Iron:* 2.7 mg

SIDE DISHES

BROCCOLI WITH PECAN CRUMBS

serves 4

1 pound broccoli (1 bunch)
2 teaspoons olive oil
2 tablespoons very finely minced pecans
¾ teaspoon basil

---

1. Cut the broccoli into bite-sized pieces. Peel the stems if tough. Set the pieces in a steamer over boiling water; cover and steam until tender, but still crisp—about 9 minutes.

2. Meanwhile, heat the oil in a nonstick sauté pan. Add pecans and basil. Sauté on medium-high heat until heated through and fragrant—about 2 minutes.

3. Toss the broccoli with the pecan crumbs. Serve warm as an accompaniment to salmon, or slightly chilled in lettuce leaves as a salad. The broccoli may also be tossed with cooked pasta, like ziti, for an interesting main-dish salad.

Calories: 75	*Fat:* 5 g	*Cholesterol:* 0 mg
Sodium: 31 mg	*Calcium:* 62 mg	*Iron:* 1.2 mg

CURRIED CARROT PURÉE

serves 4

1 pound carrots, peeled and trimmed
2 teaspoons olive oil
1 teaspoon curry powder, or to taste
1 leek, white part only, rinsed thoroughly, and finely chopped

1. Trim the carrots, then cut them into chunks. Simmer in boiling water until tender—about 10 minutes (or microwave the carrots with 2 tablespoons of water, covered, on full power until tender—about 5 minutes). Drain.

2. Heat the oil in a nonstick sauté pan. Add the curry powder and leeks and sauté over medium heat until the leeks start to brown and the curry is very fragrant—about 4 minutes.

3. Combine the carrots and leeks in a blender or processor. (Use a rubber spatula to scrape in all the curry). Process until smooth. Serve hot with lean roasted meats or poultry.

Calories: 73	*Fat:* 3 g	*Cholesterol:* 0 mg
Sodium: 38 mg	*Calcium:* 37 mg	*Iron:* 0.9 mg

CAULIFLOWER TANDOOR STYLE

serves 4

Rich and delicious results, without a drop of added fat.

1 cup nonfat yogurt
2 cloves garlic, mashed
½ teaspoon freshly ground cumin
½ teaspoon paprika
1 head cauliflower with tight buds

1. In a small bowl combine the yogurt, garlic, cumin, and paprika.

2. Set the stem of the cauliflower in the hole of a ring or tube pan, then set the ring pan in a larger pan to catch drips.

3. Spoon the yogurt mixture over the cauliflower, covering the entire head. Let marinate for about 15 minutes.

4. Meanwhile, preheat the oven to 500° F. Bake the cauliflower in the middle of the oven until cooked through and richly burnished on the outside—about 20–25 minutes.

5. Cut the cauliflower into serving pieces right from the ring pan. Serve hot with poached chicken or a grilled turkey steak.

Calories: 52 *Fat:* less than 1 g *Cholesterol:* 1 mg
Sodium: 54 mg *Calcium:* 138 mg *Iron:* 0.7 mg

ROASTED EGGPLANT WITH GARLIC AND THYME

serves 4

1 large eggplant (about 1½ pounds)
1 bulb garlic, separated into cloves but not peeled
2 tablespoons olive oil
1 tablespoon thyme

1. Preheat the oven to 400° F.

2. Cut the eggplant into 1-inch chunks and blanch in boiling water until barely tender—about 4 minutes. Drain and pat dry.

3. Place eggplant in a glass baking dish large enough to contain eggplant in a single layer. Add garlic, olive oil, and thyme. Toss so that eggplant and garlic are coated with oil and thyme.

4. Roast uncovered until the eggplant and garlic are tender—about 20–25 minutes. Stir once during cooking. Serve warm as an accompaniment to lamb or poultry. To enjoy the garlic, squeeze the tender meat out of its papery wrapper and spread onto a chunk of eggplant or some crusty bread.

Calories: 120 *Fat:* 7 g *Cholesterol:* 0 mg
Sodium: 9 mg *Calcium:* 98 mg *Iron:* 2.4 mg

POLENTA WITH MUSHROOMS AND TOMATOES

serves 4

1 cup sliced mushrooms
3 cups water
1 cup yellow cornmeal
2 tablespoons freshly grated Romano cheese
2 medium tomatoes, cored, juiced and chopped

---

1. Heat a nonstick sauté pan over medium-high heat, and toss in the mushrooms. Sauté until fragrant and brown and no liquid is left in the pan—about 3–4 minutes.

2. Combine water and cornmeal in a medium saucepan and bring to a boil. Reduce the heat to low and simmer, stirring frequently to form a smooth texture, until all the liquid is absorbed—about 20 minutes. Fold in the Romano, tomatoes, and mushrooms.

3. Spray an 8-×-8-inch dish with nonstick spray and spoon in the polenta. Cover loosely with waxed paper and leave at room temperature until solid—about 3 hours. Slice into squares and serve at room temperature with a crisp spinach salad, or heat the squares gently in a nonstick pan and serve with hot soup.

Calories: 151	*Fat:* 1 g	*Cholesterol:* 3 mg
Sodium: 36 mg	*Calcium:* 34 mg	*Iron:* 1.5 mg

VEGETABLE PAELLA WITH FETA CHEESE

serves 4

2 teaspoons olive oil
½ teaspoon saffron threads
2 cups cooked rice (long grain brown is best for added fiber)
1 cup bite-sized broccoli florets
1 cup julienned carrots
1 cup julienned green peppers
2 cloves garlic, mashed
3 tablespoons dry white wine
2 tablespoons very finely minced fresh parsley
2 tablespoons crumbled feta cheese

---

1. Warm oil in large paella pan (or large sauté pan) over medium-high heat. Crush the saffron between your fingers and add it to the oil. Sauté briefly, until the saffron has colored the oil. Then stir in the rice, broccoli, carrot, pepper, garlic, and wine, and sauté until the vegetables are just tender—about 6 minutes. Add the parsley and feta, and continue to sauté until the feta has softened—about 1 minute.

2. Serve warm with a ripe tomato salad.

Calories: 182 *Fat:* 4 g *Cholesterol:* 4 mg
Sodium: 70 mg *Calcium:* 64 mg *Iron:* 1.4 mg

FROZEN CANTALOUPE-BLUEBERRY YOGURT

serves 4

A delicious alternative to high-fat ice cream.

1 small, ripe cantaloupe
¼–⅓ cup sugar (depending on the sweetness of the cantaloupe)
2 cups plain nonfat yogurt
1 teaspoon vanilla
1 cup blueberries

---

1. Peel and chop the cantaloupe. Place in a blender or processor with the sugar and mix until smooth.

2. In a medium bowl, fold the cantaloupe purée into the yogurt, adding the vanilla.

3. Process mixture in an ice-cream maker according to manufacturer's instructions. Fold in berries and serve in chilled dishes. This can also be served on top of crêpes, or sandwiched between crisp whole grain waffles as a dessert with brunch.

Calories: 163	*Fat:* less than 1 g	*Cholesterol:* 2 mg
Sodium: 94 mg	*Calcium:* 234 mg	*Iron:* 0.3 mg

RED AND GREEN GRAPES WITH WALNUTS AND YOGURT CREAM

serves 4

1 cup plain nonfat yogurt
1 cup seedless red grapes
1 cup seedless green grapes
1 tablespoon brown sugar
2 tablespoons chopped toasted walnuts

---

1. Line a fine-mesh strainer with a paper towel and set it in the sink. Then spoon in the yogurt and let it drain for about an hour.

2. Combine the red and green grapes in a serving bowl. In a small bowl fold the sugar into the yogurt. Add yogurt to the grapes and toss to coat. Sprinkle with the walnuts and serve at room temperature or very slightly chilled as a light dessert.

Note: To toast walnuts, stir chopped nuts in a dry, nonstick sauté pan over medium heat until fragrant and toasted—about 2 minutes. Don't leave them unattended as they burn quickly.

Calories: 112	*Fat:* 3 g	*Cholesterol:* 1 mg
Sodium: 46 mg	*Calcium:* 127 mg	*Iron:* 0.4 mg

MANGO SORBET

serves 4

1 large ripe mango
1 cup orange juice
1 cup white grape juice
Juice and pulp of 1 lime

---

1. Use a paring knife to peel the skin from the mango, holding the fruit over the blender container to catch all its juice. Then slice the mango straight into the blender, working your way around the stone.

2. Pour in the orange and grape juice and process until smooth. Scoop into an ice-cream maker and process according to manufacturer's instructions. Serve in orange shells or chilled ice-cream dishes.

Note: If you don't have an ice-cream maker, freeze the mixture in a shallow dish and purée in a blender or processor every half hour until frozen. If you have a juicer, freeze the mixture, break into chunks and process.

Calories: 104	*Fat:* less than 1 g	*Cholesterol:* 0 mg
Sodium: 3 mg	*Calcium:* 16 mg	*Iron:* 0.2 mg

PLUM GRATINÉ

serves 6

If you crave pie, but don't want its fat and calories, try this attractive and tasty alternative.

1½ pound ripe plums
2 tablespoons apple juice concentrate
1 tablespoon honey
½ teaspoon cinnamon
2 tablespoons crushed cookies (macaroons are nice)

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1. Preheat the oven to 350° F.

2. Halve the plums, remove pits, then halve again the long way. Arrange the quartered plums in a concentric circle or other attractive pattern in the bottom of a lightly oiled, 8-inch tart pan.

3. Combine the juice concentrate and honey in a small saucepan and heat gently until just warmed (or microwave in a small dish on full power). Stir in the cinnamon. Using a pastry brush, paint the plums with the topping. After coating, sprinkle on the crushed cookies. Bake until the plums are soft and fragrant—about 25 minutes.

4. Serve warm topped with low-fat vanilla yogurt. The gratiné can also be made ahead and reheated for breakfast, where it makes a superb topping for hot oatmeal or oat bran.

Calories: 90	*Fat:* 1 g	*Cholesterol:* 1 mg
Sodium: 7 mg	*Calcium:* 9 mg	*Iron:* 0.3 mg

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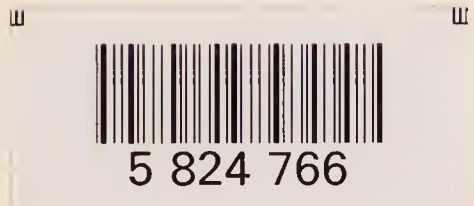

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